ATTACHMENT D1

NO ACTION LEVEL SCREENING VALUES

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D1. NO ACTION LEVEL SCREENING VALUES

The Risk Methods Document (RMD) identifies those constituents considered potential chemicals of potential concern (COPCs) at the Paducah Gaseous Diffusion Plant (PGDP) and tabulates their no action levels (NALs). Several revisions to exposure parameters have occurred since the last approved update to the RMD, resulting in revised NALs. These NALs have been reviewed by the Paducah Risk Assessment Working Group (RAWG) consisting of members from the U.S. Department of Energy, U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection. The RAWG utilizes the Risk Assessment Information System, located at the Web site http://rais.ornl.gov, to calculate NALs. Those NALs are presented here.

Additionally, several constituents were detected in samples evaluated for the Soils Operable Unit (OU) Remedial Investigation (RI) 2 for which there previously were no tabulated child residential NALs. Because this residential NAL is used in the risk assessment for identification of potential COPCs, it was necessary to develop child resident NALs consistent with the approach documented in the RMD to identify COPCs in the risk assessment. These constituents are listed in Table D1.1.

Table D1.1. Soils OU Constituents with No Published PGDP Tabulated Residential NALs

Metals	
Lithium	Tin
Organics	
(1,1-Dimethylethyl)benzene	Butyl benzyl phthalate
(1-Methylpropyl)benzene	Butylbenzene
1,2,4-Trichlorobenzene	Carbon disulfide
1,2,4-Trimethylbenzene	Dibenzofuran
1,2-Dichlorobenzene	Dibromochloromethane
1,3,5-Trimethylbenzene	Diethyl ether
1,4-Dichlorobenzene	Di-n-butyl phthalate
2,4-Dinitrotoluene	Methylene Chloride
2-Hexanone	N-Nitrosodiphenylamine
2-Methylnaphthalene	Propylbenzene
Acetone	Styrene
Benzoic acid	
Radionuclides	
Actinium-228	Radium-223
Bismuth-211	Radium-226
Bismuth-212	Radium-228
Bismuth-214	Radon-219
Cobalt-60	Strontium-90
Lead-211	Thallium-208
Lead-212	Thorium-227
Lead-214	Thorium-228
Protactinium-231	Thorium-229
Protactinium-233	Thorium-232

Toxicity values for the COPCs identified in the RMD with tabulated NALs are listed in Table D1.2a. Available toxicity values for constituents not identified in the RMD are listed in Table D1.2b, following those that are listed. The derived cancer and noncancer NALs used as residential screening values to identify COPCs are presented in Table D1.3. Consistent with the RMD, the noncancer NAL is based on the child resident and the NAL for carcinogens is based on the aggregate resident (30-year exposure). These NALs were used to identify COPCs in surface and subsurface soils in Tables D.4 and D.5. Additional screening values used in this RI are presented in Tables D1.4 and D1.5.

The constituents listed below were detected in Soils OU RI 2 soils, but have no toxicity values for which to determine screening values.

- Benzo(ghi)perylene is a noncarcinogenic polycyclic aromatic hydrocarbon (PAH). It has no toxicity criteria. Similar to anthracene and pyrene, noncarcinogenic PAHs are not classifiable as to their carcinogenicity to humans. Although no specific reference doses have been provided by EPA for these, frequently they are screened based on values derived for pyrene or other noncarcinogenic PAHs. If the NAL for pyrene were to be used as a surrogate for benzo(ghi)perylene, the PAH would not be a COPC.

- 1,3-Dichlorobenzene according to the Agency for Toxic Substances and Disease Registry (ATSDR), "Very little is known about the health effects of 1,3-dichlorobenzene, especially in humans, but they are likely to be similar to those of 1,2- and 1,4-dichlorobenzene."[1] The child resident NAL for 1,2-DCB is 29.2 mg/kg and for 1,4-DCB is 0.813 mg/kg, both significantly higher than the maximum reported concentration of 1,3-DCB of 0.0028 mg/kg. In addition, it was reported infrequently. These things suggest this compound would not be a COPC or impact the results of the risk assessment.

- 1-Methyl-4-(1-methylethyl)benzene has no additional information from EPA or the ATSDR. The maximum detected value in Soils OU RI 2 soils is 0.0019 mg/kg.

- 1,4-Cineole and cineole have no additional information from EPA or the ATSDR. The maximum detected value in Soils OU RI 2 soils is 0.033 mg/kg.

- Dimethyl phthalate has no additional information from EPA or the ATSDR. The maximum detected value in Soils OU RI 2 soils is 0.430000071 mg/kg.

- Silicon has no additional information from EPA or the ATSDR. The maximum detected value in Soils OU RI 2 soils is 2420 mg/kg.

- Sulfur is generally recognized as safe according to an EPA fact sheet if exposed at low levels. The maximum detected sulfur in Soils OU RI 2 soils is 0.4 mg/kg.

[1] Accessed at http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=703&tid=126

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides)

Chemical Abstract Number	Analyte	Oral Slope Factor (SFo)	SFo Ref	Inhalation Unit Risk (IUR)	IUR Ref	Oral RfD (RfDo)	RfDo Ref	Inhalation (RfCi)	RfCi Ref
7429905	Aluminum					1.00E+00	P	5.00E-03	P
7440360	Antimony (metallic)					4.00E-04	I		
7440382	Arsenic, Inorganic	1.50E+00	I	4.30E-06	I	3.00E-04	I	1.50E-05	C
7440393	Barium					2.00E-01	I	5.00E-04	H
7440417	Beryllium and compounds			2.40E-06	I	2.00E-03	I	2.00E-05	I
7440428	Boron And Borates Only					2.00E-01	I	2.00E-02	H
7440439	Cadmium (Diet)			1.80E-06	I	1.00E-03	I	1.00E-05	A
7440439	Cadmium (Water)			1.80E-06	I	5.00E-04	I	1.00E-05	A
7440473	Chromium (Total)[a]			8.40E-05	S	1.50E+00			
16065831	Chromium(III), Insoluble Salts					1.50E+00	I		
18540299	Chromium(VI)	5.00E-01	J	8.40E-05	S	3.00E-03	I	1.00E-04	I
7440484	Cobalt			9.00E-06	P	3.00E-04	P	6.00E-06	P
7440508	Copper					4.00E-02	H		
16984488	Fluoride					4.00E-02	C	1.30E-02	C
7439896	Iron					7.00E-01	P		
7439965	Manganese (Diet)					1.40E-01	I	5.00E-05	I
7439965	Manganese (Non-diet)					2.40E-02	S	5.00E-05	I
7439976	Mercury, Inorganic Salts					3.00E-04	S		
7439987	Molybdenum					5.00E-03	I		
7440020	Nickel Soluble Salts			2.60E-07	C	2.00E-02	I	9.00E-05	A
7782492	Selenium					5.00E-03	I	2.00E-02	C
7440224	Silver					5.00E-03	I		
7440280	Thallium (Soluble Salts)					1.00E-05	P		
N/A	Uranium (Soluble Salts)					3.00E-03	I	4.00E-05	A
N/A	Vanadium and Compounds					5.04E-03	S	1.00E-04	A
7440666	Zinc and Compounds					3.00E-01	I		
83329	Acenaphthene					6.00E-02	I		
208968	Acenaphthylene[b]					6.00E-02	I		
107131	Acrylonitrile	5.40E-01	I	6.80E-08	I	4.00E-02	A	2.00E-03	I
120127	Anthracene					3.00E-01	I		
71432	Benzene	5.50E-02	I	7.80E-09	I	4.00E-03	I	3.00E-02	I
117817	Bis(2-ethylhexyl)phthalate	1.40E-02	I	2.40E-09	C	2.00E-02	I		
75274	Bromodichloromethane	6.20E-02	I	3.70E-08	C	2.00E-02	I		
86748	Carbazole	2.00E-02	H						
56235	Carbon Tetrachloride	7.00E-02	I	6.00E-09	I	4.00E-03	I	1.00E-01	I
67663	Chloroform	3.10E-02	C	2.30E-08	I	1.00E-02	I	9.77E-02	A
75718	Dichlorodifluoromethane (Freon-12)[c]					2.00E-01	I	1.00E-01	P
75343	Dichloroethane, 1,1-[c]	5.70E-03	C	1.60E-09	C	2.00E-01	P	5.00E-01	H
107062	Dichloroethane, 1,2-	9.10E-02	I	2.60E-08	I	6.00E-03	P	7.00E-03	P
75354	Dichloroethylene, 1,1-					5.00E-02	I	2.00E-01	I
540590	Dichloroethylene, 1,2- (Mixed Isomers)					9.00E-03	H		
156592	Dichloroethylene, 1,2-*cis*-					2.00E-03	I		

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides) (Continued)

Chemical Abstract Number	Analyte	Oral Slope Factor (SFo)	Sfo Ref	Inhalation Unit Risk (IUR)	IUR Ref	Oral RfD (RfDo)	RfDo Ref	Inhalation (RfCi)	RfCi Ref
156605	Dichloroethylene, 1,2-*trans*-					2.00E-02	I	6.00E-02	P
60571	Dieldrin	1.60E+01	I	4.60E-06	I	5.00E-05	I		
1746016	Dioxins/Furans, Total (from 2,3,7,8-TCDD)	1.30E+05	C	3.80E-02	C	7.00E-10	I	4.00E-08	C
100414	Ethylbenzene	1.10E-02	C	2.50E-09	C	1.00E-01	I	1.00E+00	I
206440	Fluoranthene					4.00E-02	I		
86737	Fluorene					4.00E-02	I		
118741	Hexachlorobenzene	1.60E+00	I	4.60E-07	I	8.00E-04	I		
91203	Naphthalene			3.40E-08	C	2.00E-02	I	3.00E-03	I
88744	Nitroaniline, 2-					1.00E-02	P	5.00E-05	P
621647	Nitroso-di-N-propylamine, N-	7.00E+00	I	2.00E-06	C				
87865	Pentachlorophenol	4.00E-01	I	5.10E-09	C	5.00E-03	I		
85018	Phenanthrene[b]					4.00E-02	I		
1336363	Polychlorinated Biphenyls (high risk)	2.00E+00	I	5.71E-07	I				
50328	Polycyclic aromatic hydrocarbons (cPAH), Total Carcinogenic (from benz[a]pyrene)	7.30E+00	I	1.10E-06	C				
129000	Pyrene					3.00E-02	I		
127184	Tetrachloroethylene	2.10E-03	I	2.60E-10	I	6.00E-03	I	4.00E-02	I
108883	Toluene[c]					8.00E-02	I	5.00E+00	I
71556	Trichloroethane, 1,1,1-					2.00E+00	I	5.00E+00	I
79005	Trichloroethane, 1,1,2-	5.70E-02	I	1.60E-08	I	4.00E-03	I	2.00E-04	P
79016	Trichloroethylene	4.60E-02	I	4.10E-09	I	5.00E-04	I	2.00E-03	I
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon-113)[c]					3.00E+01	I	3.00E+01	H
75014	Vinyl Chloride	7.20E-01	I	4.40E-09	I	3.00E-03	I	1.00E-01	I
1330207	Xylene, Mixture					2.00E-01	I	1.00E-01	I
108383	Xylene, m-					2.00E-01	S	1.00E-01	S
95476	Xylene, o-					2.00E-01	S	1.00E-01	S
106423	Xylene, P-					2.00E-01	S	1.00E-01	S

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides) (Continued)

Chemical Abstract Number	Analyte	Oral Slope Factor (SFo)	Sfo Ref	Inhalation Unit Risk (IUR)	IUR Ref	Oral RfD (RfDo)	RfDo Ref	Inhalation (RfCi)	RfCi Ref
7439932	Lithium					2.00E-03	I		
7440315	Tin					6.00E-01	H		
98066	(1,1-Dimethylethyl)benzene					1.00E-01	P		
135988	(1-Methylpropyl)benzene					1.00E-01	P		
120821	1,2,4-Trichlorobenzene	2.90E-02	P			1.00E-02	I	2.00E-03	P
95636	1,2,4-Trimethylbenzene					5.00E-02	P	7.00E-03	P
95501	1,2-Dichlorobenzene					9.00E-02	I	2.00E-01	H
108678	1,3,5-Trimethylbenzene					1.00E-02	P	6.00E-03	P
106467	1,4-Dichlorobenzene					7.00E-02	A	8.00E-01	I
121142	2,4-Dinitrotoluene	3.10E-01	C	8.90E-05	C	2.00E-03	I		
591786	2-Hexanone					5.00E-03	I	3.00E-02	I
91576	2-Methylnaphthalene					4.00E-03	I		
67641	Acetone					9.00E-01	I	3.09E+01	A
65850	Benzoic acid					4.00E+00	I		
85687	Butyl benzyl phthalate	1.90E-03	P			2.00E-01	I		
104518	Butylbenzene					5.00E-02	P		
75150	Carbon disulfide					1.00E-01	I	7.00E-01	I
132649	Dibenzofuran					1.00E-03	P		
124481	Dibromochloromethane	8.40E-02	I			2.00E-02	I		
60297	Diethyl ether					2.00E-01	I		
84742	Di-n-butyl phthalate					1.00E-01	I		
75092	Methylene chloride	2.00E-03	I	1.00E-08	I	6.00E-03	I	6.00E-01	I
86306	N-Nitrosodiphenylamine	4.90E-03	I	2.60E-06	C	2.00E-02	P		
103651	Propylbenzene					1.00E-01	P	1.00E+00	P
100425	Styrene					2.00E-01	I	1.00E+00	I

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides) (Continued)

Analyte	Volatile Organic?	Mutagen?	GI Absorption Factor (Unitless)	EPA ABS (Unitless)	ABS Ref	PEF Res.	PEF Ind./ Comm.	VF Res.	VF Ind./ Comm.	KY ABS (Unitless)	Permeability Constant	Perm. Const. Ref
Aluminum			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Antimony (metallic)			1.50E-01		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Arsenic, Inorganic			1.00E+00	3.00E-02	RAGSE	1.36E+09	1.36E+09			3.00E-02	1.00E-03	RAGSE
Barium			7.00E-02		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Beryllium and compounds			7.00E-03		RAGSE	1.36E+09	1.36E+09			7.00E-03	1.00E-03	RAGSE
Boron And Borates Only			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Cadmium (Diet)			2.50E-02	1.00E-03	RAGSE	1.36E+09	1.36E+09			1.00E-03	1.00E-03	RAGSE
Cadmium (Water)			5.00E-02	1.00E-03	RAGSE					1.00E-03	1.00E-03	RAGSE
Chromium (Total)[a]			1.30E-02		RAGSE	1.36E+09	1.36E+09			1.30E-02	1.00E-03	RAGSE
Chromium(III), Insoluble Salts			1.30E-02		RAGSE	1.36E+09	1.36E+09			1.30E-02	1.00E-03	RAGSE
Chromium(VI)		YES	2.50E-02		RAGSE	1.36E+09	1.36E+09			2.50E-02	2.00E-03	RAGSE
Cobalt			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	4.00E-04	RAGSE
Copper			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Fluoride			1.00E+00		RAGSE	1.36E+09	1.36E+09				1.00E-03	RAGSE
Iron			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Manganese (Diet)			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Manganese (Non-diet)			4.00E-02		RAGSE	1.36E+09	1.36E+09			4.00E-02	1.00E-03	RAGSE
Mercury, Inorganic Salts			7.00E-02		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Molybdenum			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Nickel Soluble Salts			4.00E-02		RAGSE	1.36E+09	1.36E+09			4.00E-02	2.00E-04	RAGSE
Selenium			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Silver			4.00E-02		RAGSE	1.36E+09	1.36E+09			4.00E-02	6.00E-04	RAGSE
Thallium (Soluble Salts)			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Uranium (Soluble Salts)			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Vanadium and Compounds			2.60E-02		RAGSE	1.36E+09	1.36E+09			5.00E-02	1.00E-03	RAGSE
Zinc and Compounds			1.00E+00		RAGSE	1.36E+09	1.36E+09			5.00E-02	6.00E-04	RAGSE
Acenaphthene	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	1.41E+05	1.41E+05	1.30E-01	8.60E-02	EPI
Acenaphthylene[b]	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	1.41E+05	1.41E+05	2.50E-01	9.11E-02	EPI
Acrylonitrile	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	7.69E+03	7.69E+03	2.50E-01	1.16E-03	EPI
Anthracene	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	5.23E+05	5.23E+05	1.30E-01	1.42E-01	EPI
Benzene	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	3.54E+03	3.54E+03	2.50E-01	1.49E-02	EPI
Bis(2-ethylhexyl)phthalate			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09				1.13E+00	EPI
Bromodichloromethane	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	3.97E+03	3.97E+03		4.02E-03	EPI
Carbazole			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09			1.00E-01	5.36E-02	EPI
Carbon Tetrachloride	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	1.49E+03	1.49E+03	2.50E-01	1.63E-02	EPI
Chloroform	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.63E+03	2.63E+03	2.50E-01	6.83E-03	EPI
Dichlorodifluoromethane (Freon-12)[c]	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	8.41E+02	8.41E+02		8.95E-03	EPI

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides) (Continued)

Analyte	Volatile Organic?	Mutagen?	GI Absorption Factor (Unitless)	EPA ABS (Unitless)	ABS Ref	PEF Res.	PEF Ind./ Comm.	VF Res.	VF Ind./ Comm.	KY ABS (Unitless)	Permeability Constant	Perm. Const. Ref
Dichloroethane, 1,1-[c]	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.08E+03	2.08E+03		6.75E-03	EPI
Dichloroethane, 1,2-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	4.57E+03	4.57E+03		4.20E-03	EPI
Dichloroethylene, 1,1-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	1.16E+03	1.16E+03	2.50E-01	1.17E-02	EPI
Dichloroethylene, 1,2- (Mixed Isomers)	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.51E+03	2.51E+03	2.50E-01	1.10E-02	EPI
Dichloroethylene, 1,2-*cis*-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.50E+03	2.50E+03	2.50E-01	1.10E-02	EPI
Dichloroethylene, 1,2-*trans*-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.51E+03	2.51E+03	2.50E-01	1.10E-02	EPI
Dieldrin			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09			1.00E-01	3.26E-02	EPI
Dioxins/Furans, Total (from 2,3,7,8-TCDD)												
Ethylbenzene	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	5.67E+03	5.67E+03	2.50E-01	4.93E-02	EPI
Fluoranthene			1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09			1.30E-01	3.08E-01	EPI
Fluorene	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	2.81E+05	2.81E+05	1.30E-01	1.10E-01	EPI
Hexachlorobenzene			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09			1.00E-01	2.54E-01	EPI
Naphthalene	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	4.63E+04	4.63E+04	1.30E-01	4.66E-02	EPI
Nitroaniline, 2-			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09			1.00E-01	4.46E-03	EPI
Nitroso-di-N-propylamine, N-			1.00E+00	1.00E-01	RAGSE	1.36E+09	1.36E+09			1.00E-01	2.33E-03	EPI
Pentachlorophenol			1.00E+00	2.50E-01	RAGSE	1.36E+09	1.36E+09				1.27E-01	EPI
Phenanthrene[b]			1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09			2.50E-01	1.44E-01	EPI
Polychlorinated Biphenyls (high risk)			1.00E+00	1.40E-01	RAGSE	1.36E+09	1.36E+09			1.40E-01	5.45E-01	EPI
Polycyclic aromatic hydrocarbons (cPAH), Total Carcinogenic (from benz[a]pyrene)												
Pyrene	YES		1.00E+00	1.30E-01	RAGSE	1.36E+09	1.36E+09	2.38E+06	2.38E+06	1.30E-01	2.01E-01	EPI
Tetrachloroethylene	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.35E+03	2.35E+03	2.50E-01	3.34E-02	EPI
Toluene[c]	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	4.29E+03	4.29E+03		3.11E-02	EPI
Trichloroethane, 1,1,1-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	1.65E+03	1.65E+03		1.26E-02	EPI
Trichloroethane, 1,1,2-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	7.22E+03	7.22E+03		5.04E-03	EPI
Trichloroethylene	YES	YES	1.00E+00		RAGSE	1.36E+09	1.36E+09	2.21E+03	2.21E+03	2.50E-01	1.16E-02	EPI
Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon-113)[c]	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	1.29E+03	1.29E+03		1.75E-02	EPI
Vinyl Chloride	YES	YES	1.00E+00		RAGSE	1.36E+09	1.36E+09	9.56E+02	9.56E+02	2.50E-01	8.38E-03	EPI
Xylene, Mixture	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	5.82E+03	5.82E+03	2.50E-01	5.00E-02	EPI
Xylene, m-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	5.47E+03	5.47E+03	2.50E-01	5.32E-02	EPI
Xylene, o-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	5.58E+03	5.47E+03	2.50E-01	4.71E-02	EPI
Xylene, P-	YES		1.00E+00		RAGSE	1.36E+09	1.36E+09	2.38E+06	5.58E+03	2.50E-01	4.93E-02	EPI

Table D1.2a. Toxicity Values and Information Used in PRG Derivation (Nonradionuclides) (Continued)

Analyte	Volatile Organic?	Mutagen?	GI Absorption Factor (Unitless)	EPA ABS (Unitless)	ABS Ref	PEF Res.	PEF Ind./ Comm.	VF Res.	VF Ind./ Comm.	KY ABS (Unitless)	Permeability Constant	Perm. Const. Ref
Lithium			1.00E+00			1.36E+09	1.36E+09					
Tin			1.00E+00			1.36E+09	1.36E+09					
(1,1-Dimethylethyl)benzene	YES		1.00E+00			1.36E+09	1.36E+09	7.36E+03				
(1-Methylpropyl)benzene	YES		1.00E+00			1.36E+09	1.36E+09	7.35E+03				
1,2,4-Trichlorobenzene	YES		1.00E+00			1.36E+09	1.36E+09	2.99E+04				
1,2,4-Trimethylbenzene	YES		1.00E+00			1.36E+09	1.36E+09	7.91E+03				
1,2-Dichlorobenzene	YES		1.00E+00			1.36E+09	1.36E+09	1.17E+04				
1,3,5-Trimethylbenzene	YES		1.00E+00			1.36E+09	1.36E+09	6.61E+03				
1,4-Dichlorobenzene	YES		1.00E+00			1.36E+09	1.36E+09	1.04E+04				
2,4-Dinitrotoluene			1.00E+00	1.02E-01		1.36E+09	1.36E+09					
2-Hexanone	YES		1.00E+00			1.36E+09	1.36E+09	1.33E+04				
2-Methylnaphthalene	YES		1.00E+00	1.00E-01		1.36E+09	1.36E+09	5.10E+04				
Acetone	YES		1.00E+00			1.36E+09	1.36E+09	1.37E+04				
Benzoic acid			1.00E+00	1.00E-01		1.36E+09	1.36E+09					
Butyl benzyl phthalate			1.00E+00	1.00E-01		1.36E+09	1.36E+09					
Butylbenzene	YES		1.00E+00			1.36E+09	1.36E+09	8.14E+03				
Carbon disulfide	YES		1.00E+00			1.36E+09	1.36E+09	1.17E+03				
Dibenzofuran	YES		1.00E+00	3.00E-02		1.36E+09	1.36E+09	1.96E+05				
Dibromochloromethane	YES		1.00E+00	1.00E-01		1.36E+09	1.36E+09	7.95E+03				
Diethyl ether	YES		1.00E+00			1.36E+09	1.36E+09	3.12E+03				
Di-n-butyl phthalate			1.00E+00	1.00E-01		1.36E+09	1.36E+09					
Methylene chloride	YES	YES	1.00E+00			1.36E+09	1.36E+09	2.19E+03				
N-Nitrosodiphenylamine			1.00E+00	1.00E-01		1.36E+09	1.36E+09					
Propylbenzene	YES		1.00E+00	1.00E-01		1.36E+09	1.36E+09	6.99E+03				
Styrene	YES		1.00E+00			1.36E+09	1.36E+09	9.35E+03				

Information compiled November 2014.
Note that the toxicity values and information is presented in a split table format.
[a] Values for Chromium (Total) use toxicity factors for Chromium III and inhalation unit cancer risk for Chromium VI.
[b] Values for Acenaphthylene and Phenanthrene, if not available use toxicity factors for Acenaphthene.
[c] Analytes are not Site COPCs, but are provided for project support.

Reference Codes:

A Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels
C The California EPA Office of Environmental Health Hazard Assessment's (OEHHA) Chronic Reference Exposure Levels (RELS) from December 18, 2008, and the Cancer Potency Values from July 21, 2009
EPI EPA's Estimation Programs Interface Suite
H HEAST
I EPA's Integrated Risk Information System (IRIS)
J New Jersey
O Oak Ridge National Laboratory (ORNL) Technical Memorandum (TM) (ORNL/TM-2013/00), July 2014
P The Provisional Peer Reviewed Toxicity Values (PPRTVs) derived by EPA's Superfund Health Risk Technical Support Center (STSC) for the EPA Superfund program
RAGSE Risk Assessment Guidance for Superfund, Part E
S Surrogate
W World Health Organization

Table D1.2b. Toxicity Values and Information Used in PRG Derivation (Radionuclides)

Chemical Abstract Number	Analyte	Inhalation Slope Factor (SFi)	SFi Ref	Oral Slope Factor for Water (SFow)	SFow Ref	Oral Slope Factor for Soil (SFos)	SFos Ref	Oral Slope Factor for Food (SFof)	External Exposure Slope Factor (SFe)	SFe Ref	GI Absorption Factor (Unitless)	GI Abs. Ref
14596102	Am-241	3.77E-08	O	1.04E-10	O	1.84E-10	O	1.34E-10	2.77E-08	O	5.00E-04	H
10045973	Cs-137+D	1.12E-10	O	3.05E-11	O	4.26E-11	O	3.74E-11	2.53E-06	O	1.00E+00	H
13994202	Np-237+D	2.87E-08	O	6.85E-11	O	1.41E-10	O	9.18E-11	8.55E-07	O		
13981163	Pu-238	5.22E-08	O	1.31E-10	O	2.25E-10	O	1.69E-10	6.91E-11	O	5.00E-04	H
15117483	Pu-239	5.55E-08	O	1.35E-10	O	2.28E-10	O	1.74E-10	2.09E-10	O	5.00E-04	H
14119336	Pu-240	5.55E-08	O	1.35E-10	O	2.28E-10	O	1.74E-10	7.12E-11	O	5.00E-04	H
14133767	Tc-99	3.81E-11	O	2.75E-12	O	7.25E-12	O	4.00E-12	8.28E-11	O	5.00E-01	H
14269637	Th-230	3.41E-08	O	9.14E-11	O	1.66E-10	O	1.19E-10	8.45E-10	O	5.00E-04	H
13966295	U-234	2.78E-08	O	7.07E-11	O	1.48E-10	O	9.55E-11	2.53E-10	O	2.00E-02	H
15117961	U-235+D	2.50E-08	O	7.18E-11	O	1.54E-10	O	9.76E-11	5.76E-07	O		
7440611	U-238+D	2.37E-08	O	8.70E-11	O	1.97E-10	O	1.21E-10	1.19E-07	O	2.00E-02	H
	Ac-228	4.92E-11				4.92E-12			4.04E-06			
	Bi-211								1.90E-07			
	Bi-212	8.44E-11				1.68E-12			4.96E-07			
	Bi-214	3.1E-11				4.03E-13			7.34E-06			
	Co-60	1.01E-10				3.81E-11			1.24E-05			
	Pb-211	4.03E-11				9.55E-13			2.91E-07			
	Pb-212	6.40E-10				6.33E-11			4.96E-07			
	Pb-214	4.00E-11				7.92E-13			9.94E-07			
	Pa-231	7.62E-08				2.98E-10			1.27E-07			
	Pa-233	1.53E-11				1.65E-11			8.03E-07			
	Ra-223	2.92E-08				5.99E-10			4.55E-07			
	Ra-226	2.82E-08				6.77E-10			2.50E-08			
	Ra-228	4.37E-08				1.98E-09			3.43E-11			
	Rn-219								2.35E-07			
	Sr-90	4.26E-10				8.62E-11			4.83E-10			
	Tl-208								1.75E-05			
	Th-227	3.50E-08				1.29E-10			4.45E-07			
14274829	Th-228	1.32E-07				2.43E-10			5.64E-09			
	Th-229	3.85E-10				1.75E-07			2.24E-07			
N2608	Th-232	4.33E-08				1.84E-10			3.58E-10			

Table D1.3. Residential NAL Development

Chemical Abstract Number	Analyte	Units	Residential (Child)		
			Hazard	Cancer	NAL
7429905	Aluminum	mg/kg	7.74E+03		7.74E+03
7440360	Antimony	mg/kg	3.13E+00		3.13E+00
7440382	Arsenic	mg/kg	1.67E+00	2.67E-01	2.67E-01
7440393	Barium	mg/kg	1.53E+03		1.53E+03
7440417	Beryllium	mg/kg	1.56E+01	1.59E+03	1.56E+01
7440428	Boron	mg/kg	1.56E+03		1.56E+03
7440439	Cadmium	mg/kg	5.07E+00	2.12E+03	5.07E+00
7440473	Chromium	mg/kg	1.17E+04	1.64E+01	1.64E+01
7440484	Cobalt	mg/kg	2.34E+00	4.24E+02	2.34E+00
7440508	Copper	mg/kg	3.13E+02		3.13E+02
16984488	Fluoride	mg/kg	3.13E+02		3.13E+02
7439896	Iron	mg/kg	5.48E+03		5.48E+03
7439921	Lead	mg/kg			4.00E+02
7439932	Lithium	mg/kg			1.56E+01
7439965	Manganese	mg/kg	1.83E+02		1.83E+02
7439976	Mercury	mg/kg	2.35E+00		2.35E+00
7439987	Molybdenum	mg/kg	3.91E+01		3.91E+01
7440020	Nickel	mg/kg	1.55E+02	1.47E+04	1.55E+02
7782492	Selenium	mg/kg	3.91E+01		3.91E+01
7440224	Silver	mg/kg	3.91E+01		3.91E+01
7440280	Thallium	mg/kg	7.82E-02		7.82E-02
7440315	Tin	mg/kg			4.69E+03
7440611	Uranium	mg/kg	2.34E+01		2.34E+01
7440622	Vanadium	mg/kg	3.93E+01		3.93E+01
7440666	Zinc	mg/kg	2.35E+03		2.35E+03
98066	(1,1-Dimethylethyl)benzene	mg/kg			7.82E+02
135988	(1-Methylpropyl)benzene	mg/kg			7.82E+02
71556	1,1,1-Trichloroethane	mg/kg	8.15E+02		8.15E+02
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	3.96E+03		3.96E+03
79005	1,1,2-Trichloroethane	mg/kg	1.50E-01	1.15E+00	1.50E-01
75343	1,1-Dichloroethane	mg/kg	1.02E+02	3.55E+00	3.55E+00
75354	1,1-Dichloroethene	mg/kg	2.27E+01		2.27E+01
120821	1,2,4-Trichlorobenzene	mg/kg			5.78E+00
95636	1,2,4-Trimethylbenzene	mg/kg			5.69E+00
95501	1,2-Dichlorobenzene	mg/kg			1.81E+02
107062	1,2-Dichloroethane	mg/kg	3.12E+00	4.64E-01	4.64E-01
540590	1,2-Dichloroethene	mg/kg	7.04E+01		7.04E+01
95476	1,2-Dimethylbenzene	mg/kg	6.45E+01		6.45E+01
108678	1,3,5-Trimethylbenzene	mg/kg			3.93E+00
106467	1,4-Dichlorobenzene	mg/kg			2.61E+00
4291796	1-Methyl-2-propylcyclohexane	mg/kg			
52663599	2,2',3,4-Tetrachlorobiphenyl	mg/kg			
121142	2,4-Dinitrotoluene	mg/kg			6.39E-01
606202	2,6-Dinitrotoluene	mg/kg			1.35E-01
78933	2-Butanone	mg/kg			2.70E+03
591786	2-Hexanone	mg/kg			2.02E+01
91576	2-Methylnaphthalene	mg/kg			1.14E+01
88744	2-Nitrobenzenamine	mg/kg	3.32E+01		3.32E+01
83329	Acenaphthene	mg/kg	1.71E+02		1.71E+02
208968	Acenaphthylene	mg/kg	1.71E+02		1.71E+02
67641	Acetone	mg/kg			6.07E+03
107131	Acrylonitrile	mg/kg	1.59E+00	2.55E-01	2.55E-01
120127	Anthracene	mg/kg	8.54E+02		8.54E+02
71432	Benzene	mg/kg	8.17E+00	1.16E+00	1.16E+00
65850	Benzoic acid	mg/kg			1.33E+04
117817	Bis(2-ethylhexyl)phthalate	mg/kg	6.67E+01	1.43E+01	1.43E+01
75274	Bromodichloromethane	mg/kg	1.56E+02	2.93E-01	2.93E-01
85687	Butyl benzyl phthalate	mg/kg			1.06E+02
104518	Butylbenzene	mg/kg			3.91E+02
86748	Carbazole	mg/kg		1.00E+01	1.00E+01

Table D1.3. Residential NAL Development (Continued)

Chemical Abstract Number	Analyte	Units	Residential (Child)		
			Hazard	Cancer	NAL
75150	Carbon disulfide	mg/kg			7.68E+01
56235	Carbon Tetrachloride	mg/kg	1.04E+01	6.53E-01	6.53E-01
67663	Chloroform	mg/kg	1.99E+01	3.16E-01	3.16E-01
156592	*cis*-1,2-Dichloroethene	mg/kg	1.56E+01		1.56E+01
132649	Dibenzofuran	mg/kg			5.57E+00
124481	Dibromochloromethane	mg/kg			6.14E-01
75718	Dichlorodifluoromethane	mg/kg	8.72E+00		8.72E+00
60571	Dieldrin	mg/kg	1.67E-01	1.26E-02	1.26E-02
60297	Diethyl ether	mg/kg			1.56E+03
84742	Di-n-butyl phthalate	mg/kg			3.34E+02
1746016	Dioxins/Furans, Total	mg/kg	3.90E-06	3.08E-06	3.08E-06
100414	Ethylbenzene	mg/kg	3.37E+02	5.78E+00	5.78E+00
206440	Fluoranthene	mg/kg	1.14E+02		1.14E+02
86737	Fluorene	mg/kg	1.14E+02		1.14E+02
118741	Hexachlorobenzene	mg/kg	2.67E+00	1.26E-01	1.26E-01
NS831	m,p-Xylene	mg/kg	5.84E+01		5.84E+01
75092	Methylene chloride	mg/kg			3.50E+01
91203	Naphthalene	mg/kg	1.16E+01	3.83E+00	3.83E+00
621647	N-Nitroso-di-N-propylamine	mg/kg		2.87E-02	2.87E-02
86306	N-Nitrosodiphenylamine	mg/kg			4.10E+01
50328	PAH, Total	mg/kg		6.19E-03	6.19E-03
1336363	PCB, Total	mg/kg		7.82E-02	7.82E-02
87865	Pentachlorophenol	mg/kg	8.96E+00	2.43E-01	2.43E-01
85018	Phenanthrene	mg/kg	1.71E+02		1.71E+02
103651	Propylbenzene	mg/kg			2.29E+02
129000	Pyrene	mg/kg	8.54E+01		8.54E+01
100425	Styrene	mg/kg			6.00E+02
127184	Tetrachloroethene	mg/kg	8.10E+00	2.36E+01	8.10E+00
108883	Toluene	mg/kg	4.89E+02		4.89E+02
1330207	Total Xylene	mg/kg	5.84E+01		5.84E+01
156605	trans-1,2-Dichloroethene	mg/kg	1.43E+01		1.43E+01
79016	Trichloroethene	mg/kg	4.12E-01	9.43E-01	4.12E-01
108054	Vinyl acetate	mg/kg			9.06E+01
75014	Vinyl Chloride	mg/kg	7.00E+00	5.92E-02	5.92E-02
108383	Xylene, m	mg/kg	5.51E+01		5.51E+01
106423	Xylene, p	mg/kg	5.61E+01		5.61E+01
14331830	Actinium-228	pCi/g			1.35E+03
14596102	Americium-241	pCi/g		3.03E+00	3.03E+00
15229375	Bismuth-211	pCi/g			4.94E+06
14913496	Bismuth-212	pCi/g			6.70E+04
14733030	Bismuth-214	pCi/g			1.38E+04
10045973	Cesium-137	pCi/g		1.16E-01	1.16E-01
10198400	Cobalt-60	pCi/g			5.98E-02
N0001	Lead-211	pCi/g			1.92E+05
15092941	Lead-212	pCi/g			6.17E+03
15067284	Lead-214	pCi/g			7.56E+04
13994202	Neptunium-237	pCi/g		2.39E-01	2.39E-01
13981163	Plutonium-238	pCi/g		4.42E+00	4.42E+00
15117483	Plutonium-239	pCi/g		3.87E+00	3.87E+00
N760	Plutonium-239/240	pCi/g		3.87E+00	3.87E+00
14119336	Plutonium-240	pCi/g		3.87E+00	3.87E+00
13966002	Potassium-40	pCi/g			2.62E-01
14331852	Protactinium-231	pCi/g			9.35E-01
13981141	Protactinium-233	pCi/g			6.42E+01
15623457	Radium-223	pCi/g			2.06E+02
13982633	Radium-226	pCi/g			1.15E+00
15262201	Radium-228	pCi/g			1.49E+00
14835020	Radon-219	pCi/g			1.30E+08
10098972	Strontium-90	pCi/g			1.26E+01
14133767	Technetium-99	pCi/g		1.17E+02	1.17E+02
14913509	Thallium-208	pCi/g			3.77E+04

Table D1.3. Residential NAL Development (Continued)

Chemical Abstract Number	Analyte	Units	Residential (Child)		
			Hazard	Cancer	NAL
15623479	Thorium-227	pCi/g			1.58E+02
14274829	Thorium-228	pCi/g			3.16E+01
15594544	Thorium-229	pCi/g			6.71E-01
14269637	Thorium-230	pCi/g		5.22E+00	5.22E+00
N2608	Thorium-232	pCi/g			4.24E+00
13966295	Uranium-234	pCi/g		5.93E+00	5.93E+00
15117961	Uranium-235	pCi/g		3.47E-01	3.47E-01
N1047	Uranium-235/236	pCi/g		3.47E-01	3.47E-01
24678828	Uranium-238	pCi/g		1.28E+00	1.28E+00

Table D1.4. Screening NALs Used in Soils OU RI 2

Analyte	Units	Industrial Worker	Teen Recreator
Aluminum	mg/kg	1.00E+05	1.00E+05
Antimony	mg/kg	9.34E+01	4.48E+01
Arsenic	mg/kg	1.41E+00	6.14E-01
Barium	mg/kg	4.04E+04	2.24E+04
Beryllium	mg/kg	4.50E+02	2.24E+02
Boron	mg/kg	4.65E+04	2.24E+04
Cadmium	mg/kg	6.12E+01	2.80E+01
Chromium	mg/kg	1.98E+02	2.04E+02
Cobalt	mg/kg	6.87E+01	3.36E+01
Copper	mg/kg	9.34E+03	4.48E+03
Fluoride	mg/kg	9.33E+03	4.48E+03
Iron	mg/kg	1.00E+05	7.85E+04
Lead	mg/kg	8.00E+02	4.00E+02
Manganese	mg/kg	4.72E+03	2.69E+03
Mercury	mg/kg	7.01E+01	3.36E+01
Molybdenum	mg/kg	1.17E+03	5.61E+02
Nickel	mg/kg	4.30E+03	2.24E+03
Selenium	mg/kg	1.17E+03	5.61E+02
Silver	mg/kg	1.17E+03	5.61E+02
Thallium	mg/kg	2.34E+00	1.12E+00
Uranium	mg/kg	6.81E+02	3.36E+02
Vanadium	mg/kg	1.15E+03	5.65E+02
Zinc	mg/kg	7.01E+04	3.36E+04
1,1,1-Trichloroethane	mg/kg	3.58E+03	1.00E+05
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	1.69E+04	1.00E+05
1,1,2-Trichloroethane	mg/kg	6.32E-01	1.17E+01
1,1-Dichloroethane	mg/kg	1.58E+01	4.64E+01
1,1-Dichloroethene	mg/kg	1.00E+02	5.61E+03
1,2-Dichloroethane	mg/kg	2.09E+00	5.34E+00
1,2-Dichloroethene	mg/kg	2.10E+03	1.01E+03
1,2-Dimethylbenzene	mg/kg	2.81E+02	2.24E+04
2-Nitrobenzenamine	mg/kg	2.91E+02	1.32E+02
Acenaphthene	mg/kg	1.40E+03	6.26E+02

Table D1.4. Screening NALs Used in Soils OU RI 2 (Continued)

Analyte	Units	Industrial Worker	Teen Recreator
Acenaphthylene	mg/kg	1.40E+03	6.26E+02
Acrylonitrile	mg/kg	1.24E+00	1.93E+00
Anthracene	mg/kg	6.99E+03	3.13E+03
Benzene	mg/kg	5.31E+00	1.19E+01
Bis(2-ethylhexyl)phthalate	mg/kg	5.88E+01	3.47E+01
Bromodichloromethane	mg/kg	1.30E+00	3.88E+00
Carbazole	mg/kg	4.12E+01	2.43E+01
Carbon Tetrachloride	mg/kg	2.96E+00	7.38E+00
Chloroform	mg/kg	1.39E+00	4.42E+00
Chrysene	mg/kg	8.94E+01	1.38E+01
cis-1,2-Dichloroethene	mg/kg	4.67E+02	2.24E+02
Dichlorodifluoromethane	mg/kg	3.68E+01	2.24E+04
Dieldrin	mg/kg	5.15E-02	3.04E-02
Dioxins/Furans, Total	mg/kg	1.63E-05	7.57E-06
Ethylbenzene	mg/kg	2.66E+01	5.96E+01
Fluoranthene	mg/kg	9.32E+02	4.17E+02
Fluorene	mg/kg	9.32E+02	4.17E+02
Hexachlorobenzene	mg/kg	5.15E-01	3.04E-01
m,p-Xylene	mg/kg	2.54E+02	2.24E+04
Naphthalene	mg/kg	1.67E+01	5.72E+01
N-Nitroso-di-N-propylamine	mg/kg	1.18E-01	6.95E-02
PAH, Total	mg/kg	8.94E-02	1.38E-02
PCB, Total	mg/kg	3.05E-01	1.89E-01
Pentachlorophenol	mg/kg	8.91E-01	5.84E-01
Phenanthrene	mg/kg	1.40E+03	6.26E+02
Pyrene	mg/kg	6.99E+02	3.13E+02
Tetrachloroethene	mg/kg	4.00E+01	2.61E+02
Toluene	mg/kg	6.25E+03	8.97E+03
Total Xylene	mg/kg	2.54E+02	2.24E+04
trans-1,2-Dichloroethene	mg/kg	6.51E+01	2.24E+03
Trichloroethene	mg/kg	1.90E+00	8.99E+00
Vinyl Chloride	mg/kg	2.06E+00	6.79E-02
Xylene, m	mg/kg	2.38E+02	2.24E+04
Xylene, p	mg/kg	2.43E+02	2.24E+04
Americium-241	pCi/g	5.99E+00	8.43E+00
Cesium-137	pCi/g	1.02E-01	3.23E-01
Neptunium-237	pCi/g	2.29E-01	6.68E-01
Plutonium-238	pCi/g	2.87E+01	1.23E+01
Plutonium-239/240	pCi/g	2.47E+01	1.08E+01
Technetium-99	pCi/g	1.20E+03	3.26E+02
Thorium-230	pCi/g	3.39E+01	1.45E+01
Uranium-234	pCi/g	5.53E+01	1.65E+01
Uranium-235	pCi/g	3.40E-01	9.68E-01
Uranium-238	pCi/g	1.60E+00	3.57E+00

Table D1.5. Dose-Based Soil/Sediment Screening Levels for Site-Related Radionuclides at PGDP

Parameter	Radionuclide	Units	Outdoor Worker 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	1.37E+01	1.65E+02	3.43E+02	1.37E+03
10045973	Cesium-137+D	pCi/g	2.28E+02	2.74E+03	5.70E+03	2.28E+04
13994202	Neptunium-237+D	pCi/g	2.14E+01	2.57E+02	5.36E+02	2.14E+03
13981163	Plutonium-238	pCi/g	1.28E+01	1.54E+02	3.20E+02	1.28E+03
15117483	Plutonium-239	pCi/g	1.18E+01	1.41E+02	2.95E+02	1.18E+03
14119336	Plutonium-240	pCi/g	1.18E+01	1.42E+02	2.95E+02	1.18E+03
14133767	Technetium-99	pCi/g	4.44E+03	5.32E+04	1.11E+05	4.44E+05
14269637	Thorium-230	pCi/g	1.40E+01	1.68E+02	3.50E+02	1.40E+03
13966295	Uranium-234	pCi/g	6.12E+01	7.35E+02	1.53E+03	6.12E+03
15117961	Uranium-235+D	pCi/g	9.54E+00	1.14E+02	2.38E+02	9.54E+02
7440611	Uranium-238+D	pCi/g	6.66E+01	7.99E+02	1.66E+03	6.66E+03
	Protactinium-231	pCi/g	4.13E+00	4.96E+01	1.03E+02	4.13E+02
	Radium-228	pCi/g	4.40E+00	5.28E+01	1.10E+02	4.40E+02
	Thorium-229	pCi/g	5.59E+00	6.71E+01	1.40E+02	5.59E+02
	Cobalt-60	pCi/g	2.75E+00	3.30E+01	6.88E+01	2.75E+02

Parameter	Radionuclide	Units	Excavation Worker 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	1.37E+01	1.65E+02	3.43E+02	1.37E+03
10045973	Cesium-137+D	pCi/g	2.28E+02	2.74E+03	5.70E+03	2.28E+04
13994202	Neptunium-237+D	pCi/g	2.14E+01	2.57E+02	5.36E+02	2.14E+03
13981163	Plutonium-238	pCi/g	1.28E+01	1.54E+02	3.20E+02	1.28E+03
15117483	Plutonium-239	pCi/g	1.18E+01	1.41E+02	2.95E+02	1.18E+03
14119336	Plutonium-240	pCi/g	1.18E+01	1.42E+02	2.95E+02	1.18E+03
14133767	Technetium-99	pCi/g	4.44E+03	5.32E+04	1.11E+05	4.44E+05
14269637	Thorium-230	pCi/g	1.40E+01	1.68E+02	3.50E+02	1.40E+03
13966295	Uranium-234	pCi/g	6.12E+01	7.35E+02	1.53E+03	6.12E+03
15117961	Uranium-235+D	pCi/g	9.54E+00	1.14E+02	2.38E+02	9.54E+02
7440611	Uranium-238+D	pCi/g	6.66E+01	7.99E+02	1.66E+03	6.66E+03
	Protactinium-231	pCi/g	4.13E+00	4.95E+01	1.03E+02	4.13E+02
	Radium-228	pCi/g	4.40E+00	5.28E+01	1.10E+02	4.40E+02
	Thorium-229	pCi/g	5.59E+00	6.71E+01	1.40E+02	5.59E+02
	Cobalt-60	pCi/g	2.75E+00	3.30E+01	6.87E+01	2.75E+02

Table D1.5. Dose-Based Soil/Sediment Screening Levels for Site-Related Radionuclides at PGDP (Continued)

Parameter	Radionuclide	Units	Industrial Worker 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	5.29E+01	6.35E+02	1.32E+03	5.29E+03
10045973	Cesium-137+D	pCi/g	1.32E+03	1.59E+04	3.31E+04	1.32E+05
13994202	Neptunium-237+D	pCi/g	5.18E+01	6.21E+02	1.29E+03	5.18E+03
13981163	Plutonium-238	pCi/g	7.17E+01	8.61E+02	1.79E+03	7.17E+03
15117483	Plutonium-239	pCi/g	6.58E+01	7.90E+02	1.65E+03	6.58E+03
14119336	Plutonium-240	pCi/g	6.59E+01	7.91E+02	1.65E+03	6.59E+03
14133767	Technetium-99	pCi/g	2.00E+04	2.40E+05	5.01E+05	2.00E+06
14269637	Thorium-230	pCi/g	7.76E+01	9.31E+02	1.94E+03	7.76E+03
13966295	Uranium-234	pCi/g	3.84E+02	4.60E+03	9.59E+03	3.84E+04
15117961	Uranium-235+D	pCi/g	8.13E+00	9.76E+01	2.03E+02	8.13E+02
7440611	Uranium-238+D	pCi/g	4.27E+02	5.13E+03	1.07E+04	4.27E+04
	Protactinium-231	pCi/g	2.22E+01	2.66E+02	5.55E+02	2.22E+03
	Radium-228	pCi/g	3.09E+01	3.70E+02	7.72E+02	3.09E+03
	Thorium-229	pCi/g	2.14E+01	2.57E+02	5.36E+02	2.14E+03
	Cobalt-60	pCi/g	2.04E+00	2.45E+01	5.09E+01	2.04E+02

Parameter	Radionuclide	Units	Adult Recreator 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	2.32E+02	2.79E+03	5.80E+03	2.32E+04
10045973	Cesium-137+D	pCi/g	6.49E+03	7.79E+04	1.62E+05	6.49E+05
13994202	Neptunium-237+D	pCi/g	1.89E+02	2.27E+03	4.74E+03	1.89E+04
13981163	Plutonium-238	pCi/g	4.13E+02	4.96E+03	1.03E+04	4.13E+04
15117483	Plutonium-239	pCi/g	3.79E+02	4.54E+03	9.47E+03	3.79E+04
14119336	Plutonium-240	pCi/g	3.80E+02	4.56E+03	9.50E+03	3.80E+04
14133767	Technetium-99	pCi/g	8.57E+04	1.03E+06	2.14E+06	8.57E+06
14269637	Thorium-230	pCi/g	4.42E+02	5.30E+03	1.10E+04	4.42E+04
13966295	Uranium-234	pCi/g	2.17E+03	2.60E+04	5.42E+04	2.17E+05
15117961	Uranium-235+D	pCi/g	2.53E+01	3.03E+02	6.31E+02	2.53E+03
7440611	Uranium-238+D	pCi/g	2.45E+03	2.94E+04	6.13E+04	2.45E+05
	Protactinium-231	pCi/g	1.11E+02	1.33E+03	2.77E+03	1.11E+04
	Radium-228	pCi/g	1.78E+02	2.14E+03	4.45E+03	1.78E+04
	Thorium-229	pCi/g	9.39E+01	1.13E+03	2.35E+03	9.39E+03
	Cobalt-60	pCi/g	6.27E+00	7.52E+01	1.57E+02	6.27E+02

Table D1.5. Dose-Based Soil/Sediment Screening Levels for Site-Related Radionuclides at PGDP (Continued)

Parameter	Radionuclide	Units	Child Recreator 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	1.04E+02	1.25E+03	2.59E+03	1.04E+04
10045973	Cesium-137+D	pCi/g	3.64E+03	4.37E+04	9.11E+04	3.64E+05
13994202	Neptunium-237+D	pCi/g	1.11E+02	1.33E+03	2.77E+03	1.11E+04
13981163	Plutonium-238	pCi/g	1.30E+02	1.56E+03	3.25E+03	1.30E+04
15117483	Plutonium-239	pCi/g	1.22E+02	1.47E+03	3.06E+03	1.22E+04
14119336	Plutonium-240	pCi/g	1.22E+02	1.47E+03	3.06E+03	1.22E+04
14133767	Technetium-99	pCi/g	1.71E+04	2.05E+05	4.27E+05	1.71E+06
14269637	Thorium-230	pCi/g	1.29E+02	1.54E+03	3.22E+03	1.29E+04
13966295	Uranium-234	pCi/g	4.85E+02	5.82E+03	1.21E+04	4.85E+04
15117961	Uranium-235+D	pCi/g	1.83E+01	2.19E+02	4.57E+02	1.83E+03
7440611	Uranium-238+D	pCi/g	5.42E+02	6.51E+03	1.36E+04	5.42E+04
	Protactinium-231	pCi/g	3.50E+01	4.20E+02	8.74E+02	3.50E+03
	Radium-228	pCi/g	1.36E+01	1.63E+02	3.40E+02	1.36E+03
	Thorium-229	pCi/g	3.74E+01	4.49E+02	9.36E+02	3.74E+03
	Cobalt-60	pCi/g	4.65E+00	5.58E+01	1.16E+02	4.65E+02

Parameter	Radionuclide	Units	Teen Recreator 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	1.73E+02	2.08E+03	4.33E+03	1.73E+04
10045973	Cesium-137+D	pCi/g	4.82E+03	5.78E+04	1.21E+05	4.82E+05
13994202	Neptunium-237+D	pCi/g	1.41E+02	1.69E+03	3.53E+03	1.41E+04
13981163	Plutonium-238	pCi/g	3.25E+02	3.90E+03	8.12E+03	3.25E+04
15117483	Plutonium-239	pCi/g	2.96E+02	3.55E+03	7.40E+03	2.96E+04
14119336	Plutonium-240	pCi/g	2.97E+02	3.57E+03	7.43E+03	2.97E+04
14133767	Technetium-99	pCi/g	5.67E+04	6.80E+05	1.42E+06	5.67E+06
14269637	Thorium-230	pCi/g	3.18E+02	3.81E+03	7.94E+03	3.18E+04
13966295	Uranium-234	pCi/g	1.12E+03	1.34E+04	2.79E+04	1.12E+05
15117961	Uranium-235+D	pCi/g	1.87E+01	2.24E+02	4.67E+02	1.87E+03
7440611	Uranium-238+D	pCi/g	1.27E+03	1.52E+04	3.16E+04	1.27E+05
	Protactinium-231	pCi/g	7.57E+01	9.09E+02	1.89E+03	7.57E+03
	Radium-228	pCi/g	1.74E+01	2.09E+02	4.36E+02	1.74E+03
	Thorium-229	pCi/g	6.77E+01	8.13E+02	1.69E+03	6.77E+03
	Cobalt-60	pCi/g	4.66E+00	5.59E+01	1.16E+02	4.66E+02

Table D1.5. Dose-Based Soil/Sediment Screening Levels for Site-Related Radionuclides at PGDP (Continued)

Parameter	Radionuclide	Units	Adult Resident 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	2.03E+01	2.43E+02	5.07E+02	2.03E+03
10045973	Cesium-137+D	pCi/g	4.62E+02	5.54E+03	1.15E+04	4.62E+04
13994202	Neptunium-237+D	pCi/g	1.81E+01	2.17E+02	4.51E+02	1.81E+03
13981163	Plutonium-238	pCi/g	3.11E+01	3.73E+02	7.78E+02	3.11E+03
15117483	Plutonium-239	pCi/g	2.85E+01	3.43E+02	7.14E+02	2.85E+03
14119336	Plutonium-240	pCi/g	2.86E+01	3.43E+02	7.15E+02	2.86E+03
14133767	Technetium-99	pCi/g	6.85E+03	8.22E+04	1.71E+05	6.85E+05
14269637	Thorium-230	pCi/g	3.34E+01	4.01E+02	8.36E+02	3.34E+03
13966295	Uranium-234	pCi/g	1.49E+02	1.78E+03	3.72E+03	1.49E+04
15117961	Uranium-235+D	pCi/g	2.59E+00	3.11E+01	6.48E+01	2.59E+02
7440611	Uranium-238+D	pCi/g	1.65E+02	1.98E+03	4.13E+03	1.65E+04
	Protactinium-231	pCi/g	8.31E+00	9.98E+01	2.08E+02	8.31E+02
	Radium-228	pCi/g	1.11E+01	1.34E+02	2.79E+02	1.11E+03
	Thorium-229	pCi/g	8.23E+00	9.87E+01	2.06E+02	8.23E+02
	Cobalt-60	pCi/g	6.47E-01	7.76E+00	1.62E+01	6.47E+01

Parameter	Radionuclide	Units	Child Resident 1 mrem/yr	12 mrem/yr	25 mrem/yr	100 mrem/yr
14596102	Americium-241	pCi/g	1.07E+01	1.28E+02	2.66E+02	1.07E+03
10045973	Cesium-137+D	pCi/g	3.37E+02	4.04E+03	8.42E+03	3.37E+04
13994202	Neptunium-237+D	pCi/g	1.29E+01	1.55E+02	3.22E+02	1.29E+03
13981163	Plutonium-238	pCi/g	1.20E+01	1.44E+02	2.99E+02	1.20E+03
15117483	Plutonium-239	pCi/g	1.13E+01	1.35E+02	2.82E+02	1.13E+03
14119336	Plutonium-240	pCi/g	1.13E+01	1.35E+02	2.82E+02	1.13E+03
14133767	Technetium-99	pCi/g	1.52E+03	1.82E+04	3.79E+04	1.52E+05
14269637	Thorium-230	pCi/g	1.19E+01	1.43E+02	2.97E+02	1.19E+03
13966295	Uranium-234	pCi/g	4.27E+01	5.13E+02	1.07E+03	4.27E+03
15117961	Uranium-235+D	pCi/g	2.49E+00	2.98E+01	6.22E+01	2.49E+02
7440611	Uranium-238+D	pCi/g	4.74E+01	5.69E+02	1.18E+03	4.74E+03
	Protactinium-231	pCi/g	3.18E+00	3.82E+01	7.95E+01	3.18E+02
	Radium-228	pCi/g	1.13E+00	1.36E+01	2.84E+01	1.13E+02
	Thorium-229	pCi/g	3.81E+00	4.57E+01	9.52E+01	3.81E+02
	Cobalt-60	pCi/g	6.45E-01	7.74E+00	1.61E+01	6.45E+01

Values in this table were calculated using the best available information in November 2014. Prior to using the values in this table (in a quantitative risk assessment), a risk assessor must be consulted to determine if any values need to be updated, and to verify that the values are being used appropriately. Screening levels are based on dose conversion factors from ICRP 72 and base external ICRP 60.

Screening Value = $[\Sigma 1/(\text{Pathway-Specific Action Levels})]^{-1}$

Pathways include ingestion, inhalation, and external gamma.

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