

Explanation of "3 Tables Comparing 500 mrem/yr DRL Concentrations to MCL or 1×10^{-4} Concentrations"

There are 3 Lotus 123 Tables provided. They are sorted by:

1. Radionuclide, in the order provided in the draft PAGs chapter
2. Risk, in order of the DRL posing the highest multiple of a 1×10^{-4} cancer incidence risk
3. MCLs, in order of the DRL posing the greatest multiple of the MCL

Rationale for Tables 2 and 3:

The CERCLA document most analogous to this PAG would be the "Final Guidance on Numeric Removal Action Levels for Contaminated Drinking Water Sites" OSWER 9360.1-02, October 25, 1993, which discusses when short-term risks from contaminated drinking water wells are high enough to warrant providing alternative (replacement) drinking water supplies. For class A carcinogens that do not have DWELs or longer-term HA's, like radionuclides, this guidance says to provide drinking water if the concentrations are above 1×10^{-4} lifetime risk (using OW methodology of 70 year exposure), or the MCL, if the MCL is greater than 1×10^{-4} lifetime risk.

Following are explanations of the information in the 3 tables.

Radionuclide column:

- Lists of radionuclides taken from Table 4.2 in draft Chapter 4 on drinking water PAGs.
- Radionuclides that are bolded and their rows are shaded were considered radionuclides of most concern for RDDs, INDs, or nuclear accidents in writeups from ORIA and Army Corps of Engineers.
- Tables that were put in the same row in Table 4.2 (e.g., Ru/Rh-106) have been broken out to facilitate comparisons between DRLs and 1×10^{-4} risk levels.

DRLs with Rad Decay column:

- Taken from Table 4.2. These were the most stringent DRLs listed and were used for comparison purposes since the other DRLs used assumptions that would not factor into CERCLA decisions about when to provide drinking water (e.g., assuming levels will decay or dilute over the year so use a level averaged over the year).

1x10⁻⁴ using OW Methods column:

For those radionuclides that do have a value listed in the column "OW risk associated with MCL", these values are based on the rounded off values in the "OW risk..." column then a hand calculation on the value in the "MCLs" column to approximate the concentration that corresponds to a 1×10^{-4} cancer incidence risk using OW methodology. Note, OW staff did not create 1×10^{-4} concentrations for these radionuclides.

For those radionuclides that do not have a value listed in the column "OW risk associated with MCL", these values are from OW.

MCLs Column:

MCLs from OW implementation guide.

Uranium MCLs are in terms of mass (micrograms per liter), not activity (picoCuries per liter). The 30 micrograms per liter MCL for the uranium element was converted to an activity for each isotope. The UMTRCA groundwater standard of 30 pCi/l for U-234 and U-238 combined was listed here for U-234 since it is a potential ARAR at CERCLA sites.

OW Risk Associated with MCL

Provided in NODA for MCLs and/or regulatory support document. Note that some MCLs that are in OW implementation guide did not appear in the support documents, which is why SF rather than OW risk is provided.

1x10⁻⁴ using SF & 70 yrs

Risk estimate developed using CERCLA rad PRG calculator, by changing "Tap water" exposure scenario defaults as follows: time of exposure from 30 years to 70 years; target risk from 1×10^{-6} to 1×10^{-4} .

Comparison of DRL to OW/SF 10⁻⁴:

Shows by a factor of #, how much DRL is greater than 1×10^{-4} risk level concentration.

What this means

- if value is 70, then **1 year** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water with a lifetime cancer incidence risk of 1×10^{-4} for a lifetime (70 years)
- if value is 840, then **1 month** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water with a lifetime cancer incidence risk of 1×10^{-4} for a lifetime (70 years)
- if value is 25,550, then **1 day** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water with a lifetime cancer incidence risk of 1×10^{-4} for a lifetime (70 years)
- if value is 127,750, then drinking **1 glass** of water (12 ounces) at DRL value will equal amount of exposure of drinking water with a lifetime cancer incidence risk of 1×10^{-4} for a lifetime (70 years)

Comparison of DRL to MCL

Shows by a factor of #, how much DRL is greater than MCL concentration.

What this means

- if value is 70, then **1 year** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water at the MCL level for a lifetime (70 years)
- if value is 840, then **1 month** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water at the MCL level for a lifetime (70 years)
- if value is 25,550, then **1 day** of drinking 2 liters of water at DRL value will equal amount of exposure of drinking water at the MCL level for a lifetime (70 years)
- if value is 127,750, then drinking **1 glass** of water (12 ounces) at DRL value will equal amount of exposure of drinking water at the MCL level for a lifetime (70 years).
- For example, drinking a very small glass of water of approximately 4 ounces with Bi-210 at the DRL concentration would result in an exposure that corresponds to drinking liters of water per day for 70 years at the MCL level.

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10⁻⁴ Concentrations

Sorted by Radionuclide

Radionuclide	Concentrations in pCi/L				Comparison shows DRL is X times 10 ⁻⁴ or MCL value		
	DRLs without Rad Decay	1x10 ⁻⁴ using OW Methods	MCLs	OW Risk Associated with MCL	1x10 ⁻⁴ using SF & 70yrs	Comparison of DRL to OW/SF 10 ⁻⁴	Comparison of DRL to MCL
H-3	10,700,000	50,000	20,000	4x10 ⁻⁵		214	535
C-14	1,210,000	2,000	2,000	1x10 ⁻⁴		605	605
Na-22	246,000	400	400	1x10 ⁻⁴		615	615
P-32	1,640,000	300	30	1x10 ⁻⁵		5,467	54,667
P-33	10,000,000				2,080	4,808	
S-35	9,900,000	6,250	500	8x10 ⁻⁶		1,584	19,800
Cl-36	877,000	875	700	8x10 ⁻⁵		1,002	1,253
K-40	134,000				83	1,614	
Ca-45	1,120,000	1,110	10	9x10 ⁻⁷		1,009	112,000
Sc-46	712,000	500	100	2x10 ⁻⁵		1,424	7,120
Ti-44	111,000				80	1,388	
V-48	1,540,000				249	6,185	
Cr-51	58,100,000	19,800	6,000	3x10 ⁻⁵		2,934	9,683
Mn-54	1,090,000	1,500	300	2x10 ⁻⁵		727	3,633
Fe-55	4,420,000	2,800	2,000	7x10 ⁻⁵		1,579	2,210
Fe-59	8,200	400	200	5x10 ⁻⁵		21	41
Co-58	1,640,000	33	300	9x10 ⁻⁴		49,200	5,467
Co-60	97,300	200	100	5x10 ⁻⁵		487	973
Ni-63	4,460,000	5,000	50	1x10 ⁻⁶		892	89,200
Zn-65	229,000	300	300	1x10 ⁻⁴		763	763
Ge-68	2,820,000				293	9,625	
Se-75	281,000	300	900	3x10 ⁻⁴		937	312
Rb-86	1,250,000	300	600	2x10 ⁻⁴		4,167	2,083
Sr-89	643,000	1,000	20	2x10 ⁻⁶		643	32,150
Sr-90	18,200	40	8	2x10 ⁻⁵		455	2,275
Y-90	6,140,000	198	60	3x10 ⁻⁵		31,010	102,333
Y-91	577,000	225	90	4x10 ⁻⁵		2,564	6,411
Zr-93	1,660,000	2,200	2,000	9x10 ⁻⁵		755	830
Zr-95	1,110,000	660	200	3x10 ⁻⁵		1,682	5,550
Nb-94	357,000				613	582	
Nb-95	1,590,000				1,940	820	
Mo-99	21,600,000	1,500	600	4x10 ⁻⁵		14,400	36,000
Tc-99	1,690,000	1,260	900	7x10 ⁻⁵		1,341	1,878
Ru-103	3,820,000	1,000	200	2x10 ⁻⁵		3,820	19,100
Ru-106	111,000	75	30	4x10 ⁻⁵		1,480	3,700
Rh-106	111,000						
Ag-110m	291,000	297	90	3x10 ⁻⁵		980	3,233
Cd-109	222,000	600	600	1x10 ⁻⁴		370	370
Cd-113m	16,100				71	227	
In-114m	352,000	150	60	4x10 ⁻⁵		2,347	5,867
Sn-113	1,290,000	750	300	4x10 ⁻⁵		1,720	4,300
Sn-123	459,000				340	1,350	
Sn-125	1,710,000	198	60	3x10 ⁻⁵		8,636	28,500
Sn-126	156,000				80	1,950	
Sb-124	559,000	300	60	2x10 ⁻⁵		1,863	9,317
Sb-126	1,650,000				184	8,967	

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10-4 Concentrations

Sorted by Radionuclide

Radionuclide	Concentrations in pCi/L				Comparison shows DRL is X times 10-4 or MCL value		
	DRLs without Rad Decay	1x10-4 using OW Methods	MCLs	OW Risk Associated with MCL	1x10-4 using SF & 70yrs	Comparison of DRL to OW/SF 10-4	Comparison of DRL to MCL
Sb-127	7,080,000				202	35,050	
Te-127	490,000	2,970	900	3x10-5		165	544
Te-129	313,000,000	20,000	2,000	1x10-5		15,650	156,500
Te-129m	702,000	225	90	4x10-5		3,120	7,800
Te-131m	15,400,000		200		247	62,348	77,000
Te-132	5,850,000		90		120	48,750	65,000
I-132	5,850,000	4,500	90	2x10-6		1,300	65,000
I-125	144,000				80	1,800	
I-129	90,900	25	1	4x10-6		3,636	90,900
I-131	450,000	75	3	4x10-6		6,000	150,000
Cs-134	37,900	0	80	3x10-2		142,125	474
Cs-136	1,430,000	400	800	2x10-4		3,575	1,788
Cs-137	51,200	100	200	2x10-4		512	256
Ba-137	51,200						
Ba-133	760,000				300	2,533	
Ba-140	1,680,000	225	90	4x10-5		7,467	18,667
La-140	12,500,000	300	60	2x10-5		41,667	208,333
Ce-141	2,660,000	750	300	4x10-5		3,547	8,867
Ce-143	27,800,000	500	100	2x10-5		55,600	278,000
Ce-144	148,000	99	30	3x10-5		1,495	4,933
Pr-144	148,000				25,200	6	
Nd-147	4,130,000	500	200	4x10-5		8,260	20,650
Pm-145	5,460,000				3,650	1,496	
Pm-147	2,720,000		600		1,210	2,248	4,533
Pm-149	20,000,000	500	100	2x10-5		40,000	200,000
Pm-151	50,000,000				453	110,375	
Sm-151	6,540,000	5,000	1,000	2x10-5		1,308	6,540
Eu-152	394,000	2,000	200	1x10-5		197	1,970
Eu-154	273,000	99	60	6x10-5		2,758	4,550
Eu-155	1,750,000	1,980	600	3x10-5		884	2,917
Gd-153	2,690,000	1,980	600	3x10-5		1,359	4,483
Tb-160	728,000	330	100	3x10-5		2,206	7,280
Ho-166m	314,000				254	1,236	
Tm-170	725,000	330	100	3x10-5		2,197	7,250
Yb-169	2,660,000				510	5,216	
Hf-181	1,380,000	500	200	4x10-5		2,760	6,900
Ta-182	614,000	500	100	2x10-5		1,228	6,140
W-187	62,700,000	1,000	200	2x10-5		62,700	313,500
Ir-192	847,000	500	100	2x10-5		1,694	8,470
Au-198	16,100,000	500	100	2x10-5		32,200	161,000
Hg-203	566,000	990	60	6x10-4		572	9,433
Tl-204	782,000	600	300	5x10-5		1,303	2,607
Pb-210	476				2	238	
Bi-207	467,000	660	200	3x10-5		708	2,335
Bi-210	5,850,000	219	15			26,712	390,000
Po-210	1,970	1	15			1,791	131

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10-4 Concentrations

Sorted by Radionuclide

Radionuclide	Concentrations in pCi/L			OW Risk Associated with MCL	1x10-4 using SF & 70yrs	Comparison shows DRL is X times 10-4 or MCL value	
	DRLs without Rad Decay	1x10-4 using OW Methods	MCLs			Comparison of DRL to OW/SF 10-4	Comparison of DRL to MCL
Ra-226	1,950	5	5	1x10-4		390	390
Ac-227	183				10	18	
Th-227	309,000	41	15			7,537	20,600
Th-228	6,940	18	15			386	463
Th-230	4,630	21	15			220	309
Th-232	942	19	15			50	63
Pa-231	231	8	15			29	15
U-232	1,960		640,000,000		7	280	0
U-233	8,770		290,000		28	313	0
U-234	9,090		190,000		29	313	0
U-234	9,090	UMTRCA GW	30		29	313	303
U-235	9,420		65		29	325	145
U-238	10,200		10		32	319	1,020
Np-237	578	32	15			18	39
Np-239	22,700,000		300		397	57,179	75,667
Pu-236	2,250	26	15			87	150
Pu-238	796				16	50	
Pu-239	727				15	48	
Pu-240	727				15	48	
Pu-241	37,900		300		1,160	33	126
Pu-242	749				16	47	
Am-241	707	19	15			37	47
Am-242m	728				29	25	
Am-243	706	19	15			37	47
Cm-242	32,500	51	15			637	2,167
Cm-243	1,020	21	15			49	68
Cm-244	1,280	23	15			56	85
Cm-245	688	19	15			36	46
Cm-246	688	19	15			36	46
Cf-252	2,460	39	15			63	164

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10⁻⁴ Concentrations

Sorted by OW/SF 1x10⁻⁴ Cancer Incidence Risk

Radionuclide	Concentrations in pCi/L				1x10 ⁻⁴ using SF & 70yrs	Comparison shows DRL is X times 10 ⁻⁴ or MCL value	
	DRLs without Rad Decay	1x10 ⁻⁴ using OW Methods	MCLs	OW Risk Associated with MCL		Comparison of DRL to OW/SF 10 ⁻⁴	Comparison of DRL to MCL
Cs-134	37,900	0	80	3x10 ⁻²		142,125	474
Pm-151	50,000,000				453	110,375	
W-187	62,700,000	1,000	200	2x10 ⁻⁵		62,700	313,500
Te-131m	15,400,000		200		247	62,348	77,000
Np-239	22,700,000		300		397	57,179	75,667
Ce-143	27,800,000	500	100	2x10 ⁻⁵		55,600	278,000
Co-58	1,640,000	33	300	9x10 ⁻⁴		49,200	5,467
Te-132	5,850,000		90		120	48,750	65,000
La-140	12,500,000	300	60	2x10 ⁻⁵		41,667	208,333
Pm-149	20,000,000	500	100	2x10 ⁻⁵		40,000	200,000
Sb-127	7,080,000				202	35,050	
Au-198	16,100,000	500	100	2x10 ⁻⁵		32,200	161,000
Y-90	6,140,000	198	60	3x10 ⁻⁵		31,010	102,333
Bi-210	5,850,000	219	15			26,712	390,000
Te-129	313,000,000	20,000	2,000	1x10 ⁻⁵		15,650	156,500
Mo-99	21,600,000	1,500	600	4x10 ⁻⁵		14,400	36,000
Ge-68	2,820,000				293	9,625	
Sb-126	1,650,000				184	8,967	
Sn-125	1,710,000	198	60	3x10 ⁻⁵		8,636	28,500
Nd-147	4,130,000	500	200	4x10 ⁻⁵		8,260	20,650
Th-227	309,000	41	15			7,537	20,600
Ba-140	1,680,000	225	90	4x10 ⁻⁵		7,467	18,667
V-48	1,540,000				249	6,185	
I-131	450,000	75	3	4x10 ⁻⁶		6,000	150,000
P-32	1,640,000	300	30	1x10 ⁻⁵		5,467	54,667
Yb-169	2,660,000				510	5,216	
P-33	10,000,000				2,080	4,808	
Rb-86	1,250,000	300	600	2x10 ⁻⁴		4,167	2,083
Ru-103	3,820,000	1,000	200	2x10 ⁻⁵		3,820	19,100
I-129	90,900	25	1	4x10 ⁻⁶		3,636	90,900
Cs-136	1,430,000	400	800	2x10 ⁻⁴		3,575	1,788
Ce-141	2,660,000	750	300	4x10 ⁻⁵		3,547	8,867
Te-129m	702,000	225	90	4x10 ⁻⁵		3,120	7,800
Cr-51	58,100,000	19,800	6,000	3x10 ⁻⁵		2,934	9,683
Hf-181	1,380,000	500	200	4x10 ⁻⁵		2,760	6,900
Eu-154	273,000	99	60	6x10 ⁻⁵		2,758	4,550
Y-91	577,000	225	90	4x10 ⁻⁵		2,564	6,411
Ba-133	760,000				300	2,533	
In-114m	352,000	150	60	4x10 ⁻⁵		2,347	5,867
Pm-147	2,720,000		600		1,210	2,248	4,533
Tb-160	728,000	330	100	3x10 ⁻⁵		2,206	7,280
Tm-170	725,000	330	100	3x10 ⁻⁵		2,197	7,250
Sn-126	156,000				80	1,950	
Sb-124	559,000	300	60	2x10 ⁻⁵		1,863	9,317
I-125	144,000				80	1,800	
Po-210	1,970	1	15			1,791	131

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10⁻⁴ Concentrations
Sorted by OW/SF 1x10⁻⁴ Cancer Incidence Risk

Radionuclide	Concentrations in pCi/L				Comparison shows DRL is X times 10 ⁻⁴ or MCL value		
	DRLs without Rad Decay	1x10 ⁻⁴ using OW Methods	MCLs	OW Risk Associated with MCL	1x10 ⁻⁴ using SF & 70yrs	Comparison of DRL to OW/SF 10 ⁻⁴	Comparison of DRL to MCL
Sn-113	1,290,000	750	300	4x10 ⁻⁵		1,720	4,300
Ir-192	847,000	500	100	2x10 ⁻⁵		1,694	8,470
Zr-95	1,110,000	660	200	3x10 ⁻⁵		1,682	5,550
K-40	134,000				83	1,614	
S-35	9,900,000	6,250	500	8x10 ⁻⁶		1,584	19,800
Fe-55	4,420,000	2,800	2,000	7x10 ⁻⁵		1,579	2,210
Pm-145	5,460,000				3,650	1,496	
Ce-144	148,000	99	30	3x10 ⁻⁵		1,495	4,933
Ru-106	111,000	75	30	4x10 ⁻⁵		1,480	3,700
Sc-46	712,000	500	100	2x10 ⁻⁵		1,424	7,120
Ti-44	111,000				80	1,388	
Gd-153	2,690,000	1,980	600	3x10 ⁻⁵		1,359	4,483
Sn-123	459,000				340	1,350	
Tc-99	1,690,000	1,260	900	7x10 ⁻⁵		1,341	1,878
Sm-151	6,540,000	5,000	1,000	2x10 ⁻⁵		1,308	6,540
Tl-204	782,000	600	300	5x10 ⁻⁵		1,303	2,607
I-132	5,850,000	4,500	90	2x10 ⁻⁶		1,300	65,000
Ho-166m	314,000				254	1,236	
Ta-182	614,000	500	100	2x10 ⁻⁵		1,228	6,140
Ca-45	1,120,000	1,110	10	9x10 ⁻⁷		1,009	112,000
Cl-36	877,000	875	700	8x10 ⁻⁵		1,002	1,253
Ag-110m	291,000	297	90	3x10 ⁻⁵		980	3,233
Se-75	281,000	300	900	3x10 ⁻⁴		937	312
Ni-63	4,460,000	5,000	50	1x10 ⁻⁶		892	89,200
Eu-155	1,750,000	1,980	600	3x10 ⁻⁵		884	2,917
Nb-95	1,590,000				1,940	820	
Zn-65	229,000	300	300	1x10 ⁻⁴		763	763
Zr-93	1,660,000	2,200	2,000	9x10 ⁻⁵		755	830
Mn-54	1,090,000	1,500	300	2x10 ⁻⁵		727	3,633
Bi-207	467,000	660	200	3x10 ⁻⁵		708	2,335
Sr-89	643,000	1,000	20	2x10 ⁻⁶		643	32,150
Cm-242	32,500	51	15			637	2,167
Na-22	246,000	400	400	1x10 ⁻⁴		615	615
C-14	1,210,000	2,000	2,000	1x10 ⁻⁴		605	605
Nb-94	357,000				613	582	
Hg-203	566,000	990	60	6x10 ⁻⁴		572	9,433
Cs-137	51,200	100	200	2x10 ⁻⁴		512	256
Co-60	97,300	200	100	5x10 ⁻⁵		487	973
Sr-90	18,200	40	8	2x10 ⁻⁵		455	2,275
Ra-226	1,950	5	5	1x10 ⁻⁴		390	390
Th-228	6,940	18	15			386	463
Cd-109	222,000	600	600	1x10 ⁻⁴		370	370
U-235	9,420		65		29	325	145
U-238	10,200		10		32	319	1,020
U-234	9,090	UMTRCA GW	30		29	313	303
U-234	9,090		190,000		29	313	0

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10⁻⁴ Concentrations

Sorted by OW/SF 1x10⁻⁴ Cancer Incidence Risk

Radionuclide	DRLs without Rad Decay	Concentrations in pCi/L		OW Risk Associated with MCL	1x10 ⁻⁴ using SF & 70yrs	Comparison shows DRL is X times 10 ⁻⁴ or MCL value	
		1x10 ⁻⁴ using OW Methods	MCLs			Comparison of DRL to OW/SF 10 ⁻⁴	Comparison of DRL to MCL
U-233	8,770		290,000		28	313	0
U-232	1,960		640,000,000		7	280	0
Pb-210	476				2	238	
Cd-113m	16,100				71	227	
Th-230	4,630	21	15			220	309
H-3	10,700,000	50,000	20,000	4x10 ⁻⁵		214	535
Eu-152	394,000	2,000	200	1x10 ⁻⁵		197	1,970
Te-127	490,000	2,970	900	3x10 ⁻⁵		165	544
Pu-236	2,250	26	15			87	150
Cf-252	2,460	39	15			63	164
Cm-244	1,280	23	15			56	85
Pu-238	796				16	50	
Th-232	942	19	15			50	63
Cm-243	1,020	21	15			49	68
Pu-239	727				15	48	
Pu-240	727				15	48	
Pu-242	749				16	47	
Am-241	707	19	15			37	47
Am-243	706	19	15			37	47
Cm-246	688	19	15			36	46
Cm-245	688	19	15			36	46
Pu-241	37,900		300		1,160	33	126
Pa-231	231	8	15			29	15
Am-242m	728				29	25	
Fe-59	8,200	400	200	5x10 ⁻⁵		21	.41
Ac-227	183				10	18	
Np-237	578	32	15			18	39
Pr-144	148,000				25,200	6	
Rh-106	111,000						
Ba-137	51,200						

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10-4 Concentrations

Sorted by MCL

Radionuclide	Concentrations in pCi/L				Comparison shows DRL is X times 10-4 or MCL value		
	DRLs without Rad Decay	1x10-4 using OW Methods	MCLs	OW Risk Associated with MCL	1x10-4 using SF & 70yrs	Comparison of DRL to OW/SF 10-4	Comparison of DRL to MCL
Bi-210	5,850,000	219	15			26,712	390,000
W-187	62,700,000	1,000	200	2x10-5		62,700	313,500
Ce-143	27,800,000	500	100	2x10-5		55,600	278,000
La-140	12,500,000	300	60	2x10-5		41,667	208,333
Pm-149	20,000,000	500	100	2x10-5		40,000	200,000
Au-198	16,100,000	500	100	2x10-5		32,200	161,000
Te-129	313,000,000	20,000	2,000	1x10-5		15,650	156,500
I-131	450,000	75	3	4x10-6		6,000	150,000
Ca-45	1,120,000	1,110	10	9x10-7		1,009	112,000
Y-90	6,140,000	198	60	3x10-5		31,010	102,333
I-129	90,900	25	1	4x10-6		3,636	90,900
Ni-63	4,460,000	5,000	50	1x10-6		892	89,200
Te-131m	15,400,000		200		247	62,348	77,000
Np-239	22,700,000		300		397	57,179	75,667
I-132	5,850,000	4,500	90	2x10-6		1,300	65,000
Te-132	5,850,000		90		120	48,750	65,000
P-32	1,640,000	300	30	1x10-5		5,467	54,667
Mo-99	21,600,000	1,500	600	4x10-5		14,400	36,000
Sr-89	643,000	1,000	20	2x10-6		643	32,150
Sn-125	1,710,000	198	60	3x10-5		8,636	28,500
Nd-147	4,130,000	500	200	4x10-5		8,260	20,650
Th-227	309,000	41	15			7,537	20,600
S-35	9,900,000	6,250	500	8x10-6		1,584	19,800
Ru-103	3,820,000	1,000	200	2x10-5		3,820	19,100
Ba-140	1,680,000	225	90	4x10-5		7,467	18,667
Cr-51	58,100,000	19,800	6,000	3x10-5		2,934	9,683
Hg-203	566,000	990	60	6x10-4		572	9,433
Sb-124	559,000	300	60	2x10-5		1,863	9,317
Ce-141	2,660,000	750	300	4x10-5		3,547	8,867
Ir-192	847,000	500	100	2x10-5		1,694	8,470
Te-129m	702,000	225	90	4x10-5		3,120	7,800
Tb-160	728,000	330	100	3x10-5		2,206	7,280
Tm-170	725,000	330	100	3x10-5		2,197	7,250
Sc-46	712,000	500	100	2x10-5		1,424	7,120
Hf-181	1,380,000	500	200	4x10-5		2,760	6,900
Sm-151	6,540,000	5,000	1,000	2x10-5		1,308	6,540
Y-91	577,000	225	90	4x10-5		2,564	6,411
Ta-182	614,000	500	100	2x10-5		1,228	6,140
In-114m	352,000	150	60	4x10-5		2,347	5,867
Zr-95	1,110,000	660	200	3x10-5		1,682	5,550
Co-58	1,640,000	33	300	9x10-4		49,200	5,467
Ce-144	148,000	99	30	3x10-5		1,495	4,933
Eu-154	273,000	99	60	6x10-5		2,758	4,550
Pm-147	2,720,000		600		1,210	2,248	4,533
Gd-153	2,690,000	1,980	600	3x10-5		1,359	4,483
Sn-113	1,290,000	750	300	4x10-5		1,720	4,300

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10-4 Concentrations

Sorted by MCL

Radionuclide	Concentrations in pCi/L				Comparison shows DRL is X times 10-4 or MCL value		
	DRLs without Rad Decay	1x10-4 using OW Methods	MCLs	OW Risk Associated with MCL	1x10-4 using SF & 70yrs	Comparison of DRL to OW/SF 10-4	Comparison of DRL to MCL
Ru-106	111,000	75	30	4x10-5		1,480	3,700
Mn-54	1,090,000	1,500	300	2x10-5		727	3,633
Ag-110m	291,000	297	90	3x10-5		980	3,233
Eu-155	1,750,000	1,980	600	3x10-5		884	2,917
Tl-204	782,000	600	300	5x10-5		1,303	2,607
Bi-207	467,000	660	200	3x10-5		708	2,335
Sr-90	18,200	40	8	2x10-5		455	2,275
Fe-55	4,420,000	2,800	2,000	7x10-5		1,579	2,210
Cm-242	32,500	51	15			637	2,167
Rb-86	1,250,000	300	600	2x10-4		4,167	2,083
Eu-152	394,000	2,000	200	1x10-5		197	1,970
Tc-99	1,690,000	1,260	900	7x10-5		1,341	1,878
Cs-136	1,430,000	400	800	2x10-4		3,575	1,788
Cl-36	877,000	875	700	8x10-5		1,002	1,253
U-238	10,200		10		32	319	1,020
Co-60	97,300	200	100	5x10-5		487	973
Zr-93	1,660,000	2,200	2,000	9x10-5		755	830
Zn-65	229,000	300	300	1x10-4		763	763
Na-22	246,000	400	400	1x10-4		615	615
C-14	1,210,000	2,000	2,000	1x10-4		605	605
Te-127	490,000	2,970	900	3x10-5		165	544
H-3	10,700,000	50,000	20,000	4x10-5		214	535
Cs-134	37,900	0	80	3x10-2		142,125	474
Th-228	6,940	18	15			386	463
Ra-226	1,950	5	5	1x10-4		390	390
Cd-109	222,000	600	600	1x10-4		370	370
Se-75	281,000	300	900	3x10-4		937	312
Th-230	4,630	21	15			220	309
U-234	9,090	UMTRCA GW	30		29	313	303
Cs-137	51,200	100	200	2x10-4		512	256
Cf-252	2,460	39	15			63	164
Pu-236	2,250	26	15			87	150
U-235	9,420		65		29	325	145
Po-210	1,970	1	15			1,791	131
Pu-241	37,900		300		1,160	33	126
Cm-244	1,280	23	15			56	85
Cm-243	1,020	21	15			49	68
Th-232	942	19	15			50	63
Am-241	707	19	15			37	47
Am-243	706	19	15			37	47
Cm-246	688	19	15			36	46
Cm-245	688	19	15			36	46
Fe-59	8,200	400	200	5x10-5		21	41
Np-237	578	32	15			18	39
Pa-231	231	8	15			29	15
U-234	9,090		190,000		29	313	0

Table Comparing 500 mrem/yr DRL Concentrations to MCL or 1 x 10-4 Concentrations

Sorted by MCL

Radionuclide	DRLs without Rad Decay	Concentrations in pCi/L		OW Risk Associated with MCL	1x10-4 using SF & 70yrs	Comparison shows DRL is X times 10-4 or MCL value	
		1x10-4 using OW Methods	MCLs			Comparison of DRL to OW/SF 10-4	Comparison of DRL to MCL
U-233	8,770		290,000		28	313	0
U-232	1,960		640,000,000		7	280	0
Pu-242	749				16	47	
Am-242m	728				29	25	
Pu-238	796				16	50	
Pu-239	727				15	48	
Pr-144	148,000				25,200	6	
Ac-227	183				10	18	
Pu-240	727				15	48	
Rh-106	111,000						
Cd-113m	16,100				71	227	
Sb-127	7,080,000				202	35,050	
Sn-126	156,000				80	1,950	
Nb-95	1,590,000				1,940	820	
Pm-151	50,000,000				453	110,375	
Sn-123	459,000				340	1,350	
Ti-44	111,000				80	1,388	
Pm-145	5,460,000				3,650	1,496	
K-40	134,000				83	1,614	
I-125	144,000				80	1,800	
Nb-94	357,000				613	582	
Ge-68	2,820,000				293	9,625	
Ba-133	760,000				300	2,533	
P-33	10,000,000				2,080	4,808	
Yb-169	2,660,000				510	5,216	
V-48	1,540,000				249	6,185	
Pb-210	476				2	238	
Ho-166m	314,000				254	1,236	
Sb-126	1,650,000				184	8,967	
Ba-137	51,200						