HPNS Default Building PRGs for Dusts (using Navy ingestion assumptions)

Resident BPRG (10-4 risk)

Radionuclide
Equillibrium BPRG for Am-241
Am-241
Co-60
Equillibrium BPRG for Cs-137
Equillibrium BPRG for Eu-152
Eu-152
Eu-154
H-3
Equillibrium BPRG for Pu-239
Pu-239
Equillibrium BPRG for Ra-226
Ra-226
Equillibrium BPRG for Sr-90
Equillibrium BPRG for Th-232
Th-232
Equillibrium BPRG for U-235
Th-231
U-235

NOTES:

1. The dust ingestion rate is the main area where there is room for USDON and USEAP to negotiate (i.e. most impact for effort).

Worker BPRG (10-4 risk)

Ingestion BPRG TR=0.0001 (pCi/cm^2)	External Exposure BPRG TR=0.0001 (pCi/cm^2)	Dust BPRG TR=0.0001 (pCi/cm^2 {super 2})	Dust BPRG TR=0.0001 (mg/cm^2 {super 2})	BPRG dpm/100 cm2	Radionuclide	Ingestion BPRG TR=0.0001 (pCi/cm^2)	External Exposure BPRG TR=0.0001 (pCi/cm^2)	Dust BPRG TR=0.0001 (pCi/cm^2 {super 2})
1.19E-01	*7.95E+00*	*1.17E-01*	*9.64E+05*	2.60E+01	*Equilibrium BPRG for Am-241*	*1.28E+00*	*3.47E+01*	*1.23E+00*
1.03E+00	2.15E+02	1.02E+00	3.51E+09	2.26E+02	Am-241	7.78E+00	9.38E+02	7.71E+00
4.97E+00	*1.84E+00*	*1.34E+00*	*1.51E+12*	2.97E+02	Co-60	9.66E+01	8.02E+00	7.41E+00
4.45E+00	*7.92E+00*	*2.85E+00*	*3.84E+11*	6.33E+02	*Equilibrium BPRG for Cs-137*	*2.23E+01*	*3.46E+01*	*1.35E+01*
3.13E+00	*3.91E+00*	*1.74E+00*	*3.17E-03*	3.86E+02	*Equilibrium BPRG for Eu-152*	*2.90E+01*	*1.71E+01*	*1.07E+01*
1.30E+01	3.91E+00	3.01E+00	5.22E+11	6.68E+02	Eu-152	2.47E+02	1.71E+01	1.60E+01
7.46E+00	*3.65E+00*	*2.45E+00*	*6.62E+11*	5.44E+02	Eu-154	1.57E+02	1.60E+01	1.45E+01
2.11E+03	-	*2.11E+03*	*2.03E+16*	4.68E+05	H-3	1.57E+04	-	1.57E+04
1.12E-01	*6.98E+00*	*1.10E-01*	*2.65E+03*	2.44E+01	*Equilibrium BPRG for Pu-239*	*1.06E+00*	*3.05E+01*	*1.02E+00*
8.31E-01	1.95E+04	8.31E-01	5.15E+07	1.84E+02	Pu-239	5.85E+00	8.53E+04	5.85E+00
3.33E-02	*2.64E+00*	*3.28E-02*	*2.67E+08*	**7.28E+00**	*Equilibrium BPRG for Ra-226*	*3.03E-01*	*1.15E+01*	*2.96E-01*
2.80E-01	6.42E+02	2.79E-01	2.76E+08	6.19E+01	Ra-226	2.40E+00	2.80E+03	2.40E+00
1.40E+00	*2.35E+02*	*1.39E+00*	*3.03E+11*	3.09E+02	*Equilibrium BPRG for Sr-90*	*1.21E+01*	*1.03E+03*	*1.19E+01*
6.52E-02	*2.01E+00*	*6.32E-02*	*1.13E+02*	1.40E+01	*Equilibrium BPRG for Th-232*	*7.72E-01*	*8.78E+00*	*7.09E-01*
1.03E+00	1.23E+04	1.03E+00	1.13E+02	2.29E+02	Th-232	8.36E+00	5.38E+04	8.35E+00
1.29E-01	*6.98E+00*	*1.27E-01*	*2.65E+03*	2.82E+01	*Equilibrium BPRG for U-235*	*1.29E+00*	*3.05E+01*	*1.24E+00*
3.18E+01	3.24E+02	2.89E+01	1.54E+16	6.42E+03	Th-231	7.81E+02	1.42E+03	5.03E+02
1.28E+00	2.89E+01	1.23E+00	2.65E+03	2.73E+02	U-235	1.44E+01	1.26E+02	1.29E+01
			minimum	7.28E+00				

Dust BPRG TR=0.0001 (mg/cm^2{super 2})	BPRG dpm/100 cm2
-	2.73E+02
3.78E-11	1.71E+03
1.20E-13	1.65E+03
-	3.00E+03
-	2.38E+03
3.60E-13	3.55E+03
2.56E-13	3.22E+03
6.60E-18	3.49E+06
-	2.26E+02
2.76E-09	1.30E+03
-	**6.57E+01**
4.22E-10	5.33E+02
-	2.64E+03
-	1.57E+02
1.09E-03	1.85E+03
-	2.75E+02
3.74E-18	1.12E+05
3.59E-05	2.86E+03
minnimum	6.57E+01

2. The most restrictive BPRG is presented as consistent with USDON survey aproach.
3. The BPRG can also be post processed (modified outside the model) to better represent likely conditons (e.g. hot spots, area factors, etc.).
4. A Derived Concentration Guideline Level for gross aplha and gross beta for equilibrium BPRGS will be higher than the PRG.
As an example: The equilibrated Th-232 chain emits 6 alphas and 3 measurable betas per decay of Th-232. Thus the gross alpha DCGL would be the BPRG*6 and the Gross
See note 5. The equlibrated Ra-226 chain gross alpha and beta DCGL would depend on assumptions regarding post Rn-220 daughter farctions.
5. The Ra-226 chain BPRG is reduced by Po-210 and Pb-210, both of these occur in the chain post Rn-222, it is likely they do not remain in dusts in equilibrium, BPRG could

Navy Ingestion Assumptions for Inpout into BPRG calculator

Frequency of hand to mouth - adult

Surface area of fingers - resident adult

Surface area of fingers - resident child

beta DCGL= BPRG*3.

be set to Ra-226?

1.64 (Average for Age 7-26 from EPA 2000 page D-4). The BPRG default values for FQ (17 events/hr child and 3 events/hr adult) are based on the 2011 Exposure Factors Handbook Table 4-1. However, there is no data for adults older than 11 years and the BPRG default values are based on those for 6-11 years. The 2017 update to Chapter 5 of the EFH uses 1 event/hr for adults (Pages 5-37, 5-65). From the 2003 World Trade Center report page D-5, the time-weighted average for adults age 7-26 is a minimum of 1.35/hr, maximum of 1.92/hr and an average of 1.64/hr.

11.5 cm2 (Area of three fingertips from Sahmel et al.,2014 rather than full area of three fingers). The EPA default for saliva extraction factor is 50% based on pesticide studies in 1994. A 2014 study (Sahmel et al.) of transfer of lead to three fingers found the factor is 24% and is more applicable to the Navy contaminants. The authors note similar in 3rd para of their introduction. See https://academic.oup.com/annweh/article/59/2/210/2740608. In the same paper, they measure the area of three fingertips. The BPRG assumes that dust is transferred from an area equivalent to three fingers, not just the tips. The paper is more accurate and their value of 11.5 cm2 for the area of three adult fingertips is used. The EPA hand areas for adults (980 cm2) and children (317 cm2) are used to get the area of three child fingertips, or 11.5*317/980 = 3.7 cm2.

3.7 cm2 (Area of three fingertips calculated from ratio of adult fingertip to finger areas, above).