COMPARISON OF ESTIMATED CANCER RISKS AND VARIOUS RADIATION MEASUREMENTS for Radium226

Residential Exposure Scenario[1]

Estimated Cancer Risks/dose vs conc'ns & instrument readings						
Cancer Risk	***10^{-6}***	***10^{-5}***	***10^{-4}***	***10^{-3}***	***10^{-2}***	***10^{-1}***
mRem/yr [Dose]	***0.05***	***0.5***	***5***	***50***	***500***	***5000***
pCi/g (Soil Conc.)	0.0124	0.124	1.24	12.4	124	1240
µR/hr (emission rate)	0.008	0.08	0.8	16	80	800

1 – 18 hrs/day; 350 days/yr, default parameters

Commercial/Industrial Scenario[2]

	Estimated Cancer Risks/dose vs conc'ns & instrument readings:					
Cancer risk	***10^{-6}***	***10^{-5}***	***10^{-4}***	***10^{-3}***	***10^{-2}***	***10^{-1}***
mRem/yr (Dose)	***0.05***	***0.5***	***5***	***50***	***500***	***5000***
pCi/g (Soil Conc.)	0.025	0.25	2.58	25.8	258	2580
µR/hr (emission rate)	0.02	0.25	2.5	25	250	2500

2 – 8 hrs/day; 250 days/yr, default parameters

FL Recreational Exposure Scenario[3]

	Estimated Cancer Risks/dose vs conc'ns & instrument readings:					
Cancer risk	***10^{-6}***	***10^{-5}***	***10^{-4}***	***10^{-3}***	***10^{-2}***	***10^{-1}***
mRem/yr (Dose)	***0.05***	***0.5***	***5***	***50***	***500***	***5000***
pCi/g (Soil Conc.)	0.097	0.97	9.7	97	970	9700
µR/hr (emission rate)	0.06	0.6	6.3	63	630	6300

3 – 4 hrs/day, 200 days/yr, FL DEP parameters

<u>Additional Clarification of Criteria, dose/risk:</u>

1) 15 mRem/yr ~ = 3×10^{-4} cancer risk as identified by OSWER guidance, 9200.4-18 as "approximately equivalent" to the upper limit of EPA's risk range.
2) Cancer risk = mrem/yr in 1st 2 rows of each table above, e.g. 10^{-4} = 5 mrem
3) Florida radiation/radium background levels: 6 µR/hr gamma instrument reading includes all radiation bkgd, terrestrial + cosmic; bkgd conc'n in soil: ~1 pCi/g, Ra^{226} ;
4) **ARAR for Radium: 5 pCi/g (+ bkgd Ra^{226} [1 pCi/g in FL]) = 6 pCi/g;**
   from Uranium Mill Tailings Radiation Control Act [40 CFR 192]:
   {~ 6pCi/g = ~ 24 mrem/yr & 5E-4 risk for residential exposure scenario
   = ~ 11 mrem/yr & 2E-4 risk for commercial/industrial
   = ~ 3 mrem/yr & 0.6 E-5 risk for FL recreational scenario}

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