Appendix A

Derived Air Concentrations (DAC) for Controlling Radiation Exposure to Workers at DOE Facilities

The derived air concentrations (DAC) for limiting radiation exposures through inhalation of radionuclides by workers are listed in this appendix. The values are based on either a stochastic (committed effective dose equivalent) dose limit of 5 rems or a non-stochastic (organ) dose limit of 50 rems per year, whichever is more limiting.

The columns in this appendix contain the following information: (1) Radionuclide; (2) inhaled air DAC for lung retention class D, W, and Y in units of µCi/ml; (3) inhaled air DAC for lung retention class D,W, and Y in units of Bq/m^3; and (4) an indication of whether or not the DAC for each class is controlled by the stochastic (effective dose equivalent) or nonstochastic (tissue) dose. The classes D,W, and Y have been established to describe the clearance of inhaled radionuclides from the lung. This classification refers to the approximate length of retention in the pulmonary region. Thus, the range of half-times for retention in the pulmonary region is less than 10 days for class D (days), from 10 to 100 days for class W (weeks), and greater than 100 days for class Y (years). The DACs are listed by radionuclide, in order of increasing atomic mass, and are based on the assumption that the particle size distribution of the inhaled material is unknown and an assumed particle size distribution of 1 µm is used. For situations where the particle size distribution is known to differ significantly from 1µm, appropriate corrections can be made to both the estimated dose to workers and the DACs.

Radionuclide	Inhaled air-lung retention class[3] µCi/ml			Inhaled air-lung retention class[3] Bq/m^3			Stochastic or organ[1]
	D	W	Y	D	W	Y	(D/ W/ Y)
H-3 (Water)[2]	2.E−05	2.E−05	2.E−05	8.E+05	8.E+05	8.E+05	St/St/St
H-3 (Elemental)[2]	5.E−01	5.E−01	5.E−01	2.E+10	2.E+10	2.E+10	St/St/St
Be-7	–	9.E−06	8.E−06	–	3.E+05	3.E+05	/St/St
Be-10	–	6.E−08	6.E−09	–	2.E+03	2.E+02	/St/St
C-11 (Org)[2]	2.E−04	2.E−04	2.E−04	6.E+06	6.E+06	6.E+06	St/St/St
C-11 (CO)[2]	5.E−04	5.E−04	5.E−04	2.E+07	2.E+07	2.E+07	St/St/St
C-11 (CO_2)[2]	3.E−04	3.E−04	3.E−04	1.E+07	1.E+07	1.E+07	St/St/St
C-14 (Org)[2]	1.E−06	1.E−06	1.E−06	4.E+07	4.E+04	4.E+07	St/St/St
C-14 (CO)[2]	7.E−04	7.E−04	7.E−04	3.E+07	3.E+07	3.E+07	St/St/St
C-14 (CO_2)[2]	9.E−05	9.E−05	9.E−05	3.E+06	3.E+06	3.E+06	St/St/St
F-18	3.E−05	4.E−05	3.E−05	1.E+06	1.E+06	1.E+06	St/St/St
Na-22	3.E−07	–	–	1.E+04	–	–	St/ /
Na-24	2.E−06	–	–	8.E+04	–	–	St/ /
Mg-28	7.E−07	5.E−07	–	3.E+04	2.E+04	–	St/St/
Al-26	3.E−08	3.E−08	–	1.E+03	1.E+03	–	St/St/
Si-31	1.E−05	1.E−05	1.E−05	4.E+05	5.E+05	4.E+05	St/St/St
Si-32	1.E−07	5.E−08	2.E−09	4.E+03	2.E+03	8.E+01	St/St/St
P-32	4.E−07	2.E−07	–	1.E+04	6.E+03	–	St/St/
P-33	3.E−06	1.E−06	–	1.E+05	4.E+04	–	St/St/
S-35	7.E−06	9.E−07	–	3.E+05	3.E+04	–	St/St/
S-35 (Gas)	–	6.E−06	–	–	2.E+05	–	/St/
Cl-36	1.E−06	1.E−07	–	4.E+04	4.E+03	–	St/St/
Cl-38	2.E−05	2.E−05	–	6.E+05	7.E+05	–	St/St/
Cl-39	2.E−05	2.E−05	–	8.E+05	9.E+05	–	St/St/
K-40	2.E−07	–	–	6.E+03	–	–	St/ /
K-42	2.E−06	–	–	7.E+04	–	–	St/ /
K-43	4.E−06	–	–	1.E+05	–	–	St/ /
K-44	3.E−05	–	–	1.E+06	–	–	St/ /
K-45	5.E−05	–	–	2.E+06	–	–	St/ /
Ca-41	–	2.E−06	–	–	6.E+04	–	./E/
Ca-45	–	3.E−07	–	–	1.E+04	–	/St/