APPENDIX L

HEALTH RISK ASSESSMENT METHODOLOGY

L.1 Airborne Emissions

We estimated the health impact risks of airborne radionuclide emissions with the DARTAB (Be80) computer code using external exposure input data (air concentration and ground surface concentration) and internal intake input data (inhalation and ingestion) from the AIRDOS-EPA (Mo79) computer code. For radon-222 daughter calculations, we performed a working level calculation using the AIRDOS-EPA code and the working level exposures for each location were used as input by the DARTAB code. We assumed the fraction of equilibrium for the working level calculations to be 0.700 (Ge78). Doses calculated by AIRDOS-EPA were not used in DARTAB.

Tables L.1 and L.2 contain the data used by DARTAB in the health impact assessment, and Table L.3 is an example input data file for a DARTAB run. The variables are described in the DARTAB manual (Be80). We calculated dose rates and somatic health risks with DARTAB using a data base developed using the RADRISK (Du80) computer code. The dose conversion factors for each radionuclide are shown in Table L.1.

The doses calculated using DARTAB were not used in the risk calculations. We used the risk conversion factors in Table L.1 for this purpose. We calculated genetically significant doses for a 30-year exposure period (the mean years of life where gonadal doses are genetically significant). In calculating external dose rates from the ground surface, external dose conversion factors for the ground surface (see Table L.1), which are for a perfect plane surface, are multiplied by 0.5 to correct for the roughness of the soil surface. A weighted mean dose equivalent rate is calculated instead of a total body dose equivalent rate. Weighting factors are chosen to have a sum of one (see Table L.2). These weighted mean dose equivalent rates are presented for perspective purposes and are not used in the risk calculations.

The somatic risk conversion factors for Rn-222 and particulate radionuclides (see Table L.1) are calculated based on external exposures and internal intakes existing for the cohort lifetime (70.7565 years average

lifetime expectancy). When the exposure time for the calculated risks was less than the expected lifetime for an individual, we calculated the risk by multiplying the risk calculated by DARTAB with the ratio of the actual exposure time to the average lifetime expectancy for an individual (e.g., the DARTAB calculated risk is multiplied by 1/70.7565 for a one-year exposure time). The risk conversion factor for Rn-222 in Table L.1 is for Rn-222 only and does not include the risk due to radon daughters. The risk due to radon daughters was calculated using a working level calculation and the fatal lung cancer risk conversion factor for a lifetime exposure given in Table L.2. The somatic health impact for the regional population (fatal cancers per year) is calculated at equilibrium for continuous exposure and is equal to the additional fatal cancers committed over all time per year of exposure.

Genetic effect risks (effects/birth) to the descendants of the exposed parent are calculated based on a 30-year exposure period. When the exposure time for the calculated risks was less than 30 years, we calculated the risk by multiplying the risk calculated by DARTAB with the ratio of the actual exposure time to 30 years (e.g., the DARTAB calculated risk is multiplied by 1/30 for a one year exposure time). Since the presented genetic effect risk is to descendants of the exposed individual or individuals, one cannot add the individual somatic and genetic effect risks presented in this report. The genetic effects per year in the regional population due to radionuclide releases from the mine are calculated for an equilibrium exposure situation. The calculated genetic effects per year at equilibrium is equal to the genetic effects committed over all time from one year exposure since the total genetic damage expressed over all generations is equal to the value in each generation reached after prolonged continuous exposure (UN77). The genetic effects committed to the regional population are calculated using risk coefficients (see Table L.2) that are based on a genetically significant dose (GSD). The fraction of the population gonadal dose that is genetically significant is 30/70.7565 where 30 is the mean individual reproductive life in years and 70.7565 is the average individual lifetime expectancy in years.

For each model uranium mine site, calculations are done separately for each mine source as well as for the total source term for the evaluated mine. The additional runs for each source allows us to identify the percentage contribution of each source to the total risk. The tables in Chapter 6

reflect results for the total mine source term and tables in Appendix L present the risk by source term as well as the total risk for each model uranium mine type. Tables L.4-L.6 contain individual fatal cancer risks and Tables L.7-L.9 contain genetic effect risks.

L.2 Aqueous Emissions

The health effects conversion factors used in the aquatic pathways are based on information contained in the RADRISK data library (Du80). The RADRISK data library is the data base used by the DARTAB computer code in computing the health impact of airborne releases. Thus, most of the philosophy of health impact determination discussed in Section L.1 above applies to aquatic releases as well as to airborne releases. The numerical values for the health effects conversion factors used for the aquatic releases are given in Appendix J along with additional discussions of the use of these factors in the aquatic calculations.

TABLE L.1
RADIONUCLIDE DOSE RATE AND HEALTH EFFECT RISK CONVERSION
FACTORS USED IN URANIUM MINE ASSESSMENTS

FOR NUCLIDE : U-238, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.200E-02

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	9.64E-07	1.53E-07	3.34E-05	3.89E-06	3.08E+05	232.
ENDOST	1.96E-06	5.63E-06	6.52E-05	1.43E-04	3.47E+05	271.
PUL	1.37E-09	2.43E-09	1.62E-02	4.13E-02	1.26E+05	85.9
MUSCLE	7.06E-09	2.76E-08	2.53E-06	7.08E-07	2.37E+05	329.
LIVER	6.07E-09	2.62E-08	5.38E-06	6.71E-07	8.53E+04	29.7
S WALL	4.31E-08	1.81E-07	6.41E-06	1.67E-07	1.07E+05	72.6
PANCREAS	6.74E-09	2.76E-08	3.29E-06	7.08E-07	7.63E+04	57.6
LLI WALL	9.76E-06	7.94E-06	2.05E-04	4.71E-06	8.18E+04	84.1
KIDNEYS	5.94E-07	2.92E-06	1.70E-05	7.47E-05	9.06E+04	30.4
BL WALL	4.57E-09	1.50E-08	7.15E-07	3.85E-07	6.58E+04	21.4
ULI WALL	1.73E-06	2.64E-06	6.94E-05	1.61E-06	6.92E+04	22.8
SI WALL	1.58E-07	4.48E-07	1.22E-05	3.23E-07	6.22E+04	20.8
OVARIES	1.45E-08	2.63E-08	1.42E-06	6.71E-07	9.60E+04	53.2
TESTES	6.04E-09	2.64E-08	1.19E-06	6.75E-07	2.62E+05	389.
SPLEEN	6.59E-09	2.76E-08	3.13E-06	7.08E-07	8.91E+04	45.8
UTERUS	7.76E-09	2.77E-08	1.38E-06	7.07E-07	2.36E+04	7.70
THYMUS	6.12E-09	2.76E-08	4.80E-06	7.08E-07	9.25E+04	30.4
THYROID	6.01E-09	2.76E-08	2.16E-06	7.07E-07	1.58E+05	70.5
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	1.55E-07	7.20E-07	1.73E-05	1.55E-05	7.86E+06	1.17E+04
OVARIES	4.03E-07	7.17E-07	2.27E-05	1.54E-05	2.88E+06	1.60E+03
AVERAGE	2.79E-07	7.19E-07	2.00E-05	1.55E-05	5.37E+06	6.63E+03

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	2.27E-07	7.62E-07	7.15E-06	1.77E-05	.100	7.55E-05
ENDOST	4.22E-08	1.22E-06	1.26E-06	2.78E-05	1.07E-02	8.34E-06
PULMNARY	5.33E-10	1.48E-08	6.32E-03	.238	7.67E-02	5.23E-05
BREAST	2.42E-09	1.02E-08	5.92E-07	2.24E-07	9.46E-02	1.31E-04
LIVER	8.26E-10	3.78E-08	4.73E-07	8.33E-07	1.33E-02	4.64E-06
ST WALL	3.72E-09	1.57E-07	4.72E-07	1.36E-07	9.28E-03	6.30E-06
PANCREAS	7.07E-10	3.10E-08	2.38E-07	6.83E-07	9.27E-03	7.00E-06
LLI WALL	6.77E-07	5.51E-06	1.32E-05	3.22E-06	5.68E-03	5.84E-06
KIDNEYS	1.89E-08	9.29E-07	4.49E-07	2.04E-05	3.14E-03	1.05E-06
BL WALL	1.42E-10	4.85E-09	1.41E-08	1.07E-07	2.28E-03	7.43E-07
ULI WALL	6.00E-08	9.16E-07	2.23E-06	5.48E-07	2.40E-03	7.91E-07
SI WALL	2.73E-09	7.78E-08	1.94E-07	5.40E-08	1.08E-03	3.61E-07
OVARIES	2.36E-10	4.21E-09	1.44E-08	9.26E-08	1.67E-03	9.23E-07
TESTES	9.20E-11	4.23E-09	1.12E-08	9.30E-08	4.55E-03	6.75E-06
SPLEEN	9.96E-11	4.43E-09	3.23E-08	9.75E-08	1.55E-03	7.95E-07
UTERUS	1.21E-10	4.43E-09	1.34E-08	9.75E-08	4.09E-04	1.34E-07
THYMUS	9.22E-11	4.43E-09	5.02E-08	9.76E-08	1.61E-03	5.27E-07
THYROID	4.61E-10	2.22E-09	1.19E-07	5.13E-08	1.34E-02	5.97E-06
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	8.37E-14	2.16E-11	6.00E-12	4.65E-10	1.61E+00	2.00E-03

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : U-234, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.200E-02

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	4.40E-09	2.07E-07	1.21E-07	5.26E-06	9.80E+05	422.
ENDOST	1.84E-08	7.03E-06	4.83E-07	1.78E-04	1.08E+06	482.
PUL	2.77E-11	2.76E-09	2.73E-04	4.70E-02	4.68E+05	177.
MUSCLE	2.70E-10	3.13E-08	1.09E-07	8.01E-07	6.15E+05	471.
LIVER	1.48E-10	3.13E-08	4.24E-08	8.01E-07	3.76E+05	100.
S WALL	4.98E-08	2.06E-07	5.34E-08	1.89E-07	3.72E+05	145.
PANCREAS	2.02E-10	3.13E-08	1.92E-08	8.01E-07	2.87E+05	115.
LLI WALL	2.19E-06	9.01E-06	1.28E-06	5.34E-06	2.90E+05	146.
KIDNEYS	8.63E-09	3.32E-06	2.24E-07	8.49E-05	3.75E+05	99.2
BL WALL	2.66E-10	1.71E-08	1.42E-09	4.37E-07	3.20E+05	82.1
ULI WALL	7.37E-07	3.00E-06	4.33E-07	1.82E-06	3.14E+05	81.7
SI WALL	1.31E-07	5.10E-07	7.77E-08	3.68E-07	3.07E+05	79.4
OVARIES	5.67E-09	3.13E-08	5.92E-09	8.01E-07	2.96E+05	107.
TESTES	1.30E-10	3.13E-08	2.18E-09	8.01E-07	6.85E+05	553.
SPLEEN	1.62E-10	3.13E-08	3.19E-08	8.01E-07	3.50E+05	112.
UTERUS	4.13E-10	3.13E-08	2.72E-09	8.01E-07	1.77E+05	43.7
THYMUS	9.68E-11	3.13E-08	3.45E-08	8.01E-07	3.35E+05	89.2
THYROID	8.99E-11	3.13E-08	6.47E-09	8.01E-07	6.18E+05	185.
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	3.62E-09	8.55E-07	4.92E-08	1.84E-05	2.06E+07	1.66E+04
OVARIES	1.70E-07	8.55E-07	1.55E-07	1.84E-05	8.88E+06	3.21E+03
AVERAGE	8.68E-08	8.55E-07	1.02E-07	1.84E-05	1.47E+07	9.90E+03

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	1.10E-09	1.02E-06	2.70E-08	2.37E-05	.319	1.37E-04
ENDOST	3.99E-10	1.52E-06	9.50E-09	3.48E-05	3.32E-02	1.48E-05
PULMNARY	1.39E-11	1.68E-08	1.15E-04	.270	.285	1.08E-04
BREAST	1.02E-10	1.15E-08	2.96E-08	2.54E-07	.245	1.88E-04
LIVER	2.16E-11	4.52E-08	4.54E-09	9.94E-07	5.87E-02	1.56E-05
ST WALL	4.32E-09	1.78E-07	3.93E-09	1.54E-07	3.23E-02	1.26E-05
PANCREAS	2.29E-11	3.51E-08	1.61E-09	7.73E-07	3.49E-02	1.40E-05
LLI WALL	1.52E-07	6.25E-06	8.77E-08	3.65E-06	2.01E-02	1.01E-05
KIDNEYS	2.75E-10	1.06E-06	6.09E-09	2.32E-05	1.30E-02	3.44E-06
BL WALL	9.08E-12	5.51E-09	3.90E-11	1.21E-07	1.11E-02	2.85E-06
ULI WALL	2.56E-08	1.04E-06	1.48E-08	6.22E-07	1.09E-02	2.84E-06
SI WALL	2.27E-09	8.85E-08	1.32E-09	6.14E-08	5.33E-03	1.38E-06
OVARIES	9.83E-11	5.02E-09	9.11E-11	1.10E-07	5.14E-03	1.86E-06
TESTES	2.12E-12	5.02E-09	2.97E-11	1.10E-07	1.19E-02	9.60E-06
SPLEEN	2.53E-12	5.02E-09	3.80E-10	1.10E-07	6.07E-03	1.94E-06
UTERUS	7.03E-12	5.02E-09	3.71E-11	1.10E-07	3.07E-03	7.58E-07
THYMUS	1.49E-12	5.02E-09	4.12E-10	1.10E-07	5.81E-03	1.55E-06
THYROID	7.02E-12	2.51E-09	4.24E-10	5.81E-08	5.23E-02	1.57E-05
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	2.61E-14	2.57E-11	3.06E-14	5.52E-10	4.41E+00	2.97E-03

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : TH-230, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.200E-03

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	2.21E-08	5.79E-05	5.23E-06	1.42E-02	3.24E+06	884.
ENDOST	1.19E-07	9.09E-04	2.91E-05	.223	3.54E+06	977.
PUL	1.65E-10	5.01E-11	3.09E-04	4.60E-02	1.66E+06	438.
MUSCLE	1.11E-09	2.28E-07	3.01E-07	5.70E-05	1.83E+06	633.
LIVER	3.49E-09	1.09E-06	9.01E-07	2.73E-04	1.40E+06	339.
S WALL	5.76E-08	1.99E-07	1.00E-07	1.29E-07	1.30E+06	353.
PANCREAS	1.10E-09	2.28E-07	2.64E-07	5.70E-05	1.03E+06	274.
LLI WALL	2.52E-06	8.83E-06	1.52E-06	5.18E-06	9.88E+05	275.
KIDNEYS	1.04E-09	2.28E-07	2.17E-07	5.70E-05	1.38E+06	335.
BL WALL	1.09E-09	1.14E-07	9.59E-08	2.85E-05	1.17E+06	284.
ULI WALL	8.45E-07	2.94E-06	5.24E-07	1.73E-06	1.20E+06	289.
SI WALL	1.49E-07	4.97E-07	1.16E-07	3.03E-07	1.16E+06	280.
OVARIES	6.69E-09	2.28E-07	1.98E-07	5.70E-05	1.04E+06	270.
TESTES	8.91E-10	2.28E-07	1.83E-07	5.70E-05	2.14E+06	769.
SPLEEN	9.95E-10	2.28E-07	2.62E-07	5.70E-05	1.32E+06	329.
UTERUS	1.78E-09	2.28E-07	1.88E-07	5.70E-05	7.27E+05	171.
THYMUS	7.83E-10	2.28E-07	2.88E-07	5.70E-05	1.29E+06	310.
THYROID	7.74E-10	2.28E-07	2.08E-07	5.70E-05	2.16E+06	544.
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	2.38E-08	6.20E-06	3.96E-06	1.30E-03	6.42E+07	2.31E+04
OVARIES	1.97E-07	6.20E-06	4.24E-06	1.30E-03	3.12E+07	8.10E+03
AVERAGE	1.11E-07	6.20E-06	4.10E-06	1.30E-03	4.77E+07	1.56E+04

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	4.76E-09	2.39E-04	1.00E-06	5.36E-02	1.05	2.88E-04
ENDOST	2.22E-09	1.70E-04	4.91E-07	3.76E-02	.109	3.01E-05
PULMNARY	6.15E-11	3.05E-10	1.30E-04	.265	1.01	2.66E-04
BREAST	3.91E-10	8.35E-08	8.53E-08	1.80E-05	.730	2.53E-04
LIVER	4.98E-10	1.57E-06	1.09E-07	3.39E-04	.219	5.29E-05
ST WALL	5.00E-09	1.72E-07	6.47E-09	1.09E-07	.113	3.06E-05
PANCREAS	1.18E-10	2.54E-07	2.33E-08	5.49E-05	.125	3.33E-05
LLI WALL	1.75E-07	6.13E-06	1.02E-07	3.55E-06	6.86E-02	1.91E-05
KIDNEYS	3.21E-11	7.26E-08	5.52E-09	1.57E-05	4.79E-02	1.16E-05
BL WALL	3.59E-11	3.63E-08	2.48E-09	7.85E-06	4.06E-02	9.86E-06
ULI WALL	2.93E-08	1.02E-06	1.75E-08	5.92E-07	4.16E-02	1.00E-05
SI WALL	2.58E-09	8.62E-08	1.73E-09	5.17E-08	2.01E-02	4.86E-06
OVARIES	1.14E-10	3.63E-08	2.59E-09	7.85E-06	1.80E-02	4.68E-06
TESTES	1.40E-11	3.63E-08	2.42E-09	7.85E-06	3.71E-02	1.33E-05
SPLEEN	1.51E-11	3.63E-08	3.28E-09	7.85E-06	2.29E-02	5.71E-06
UTERUS	2.94E-11	3.63E-08	2.50E-09	7.85E-06	1.26E-02	2.97E-06
THYMUS	1.19E-11	3.63E-08	3.65E-09	7.85E-06	2.24E-02	5.38E-06
THYROID	5.91E-11	1.82E-08	1.43E-08	4.14E-06	.183	4.61E-05
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	3.31E-14	1.86E-10	1.23E-12	3.90E-08	1.43E+01	4.68E-03

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : RA-226, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	2.54E-05	6.40E-05	2.84E-05	7.18E-05	5.49E+07	1.21E+04
ENDOST	5.07E-05	1.13E-03	5.69E-05	1.27E-03	5.87E+07	1.30E+04
PUL	1.91E-06	.0	6.33E-06	4.77E-03	3.37E+07	7.43E+03
MUSCLE	2.27E-06	2.83E-05	2.50E-06	3.17E-05	3.42E+07	7.57E+03
LIVER	1.51E-06	2.65E-05	1.70E-06	2.98E-05	2.91E+07	6.41E+03
S WALL	1.30E-06	2.08E-07	1.49E-06	1.21E-07	2.49E+07	5.49E+03
PANCREAS	2.14E-06	2.83E-05	2.41E-06	3.17E-05	2.19E+07	4.84E+03
LLI WALL	4.15E-05	1.47E-05	2.38E-05	7.84E-06	2.09E+07	4.61E+03
KIDNEYS	2.01E-06	2.65E-05	2.21E-06	2.98E-05	2.76E+07	6.09E+03
BL WALL	1.58E-06	1.41E-05	1.56E-06	1.59E-05	2.42E+07	5.35E+03
ULI WALL	8.07E-06	3.58E-06	5.57E-06	1.94E-06	2.69E+07	5.94E+03
SI WALL	2.58E-06	4.63E-07	2.42E-06	2.59E-07	2.60E+07	5.74E+03
OVARIES	2.96E-06	2.83E-05	2.68E-06	3.17E-05	2.00E+07	4.41E+03
TESTES	1.66E-06	2.83E-05	1.80E-06	3.17E-05	4.68E+07	1.03E+04
SPLEEN	1.56E-06	2.65E-05	1.75E-06	2.98E-05	2.95E+07	6.49E+03
UTERUS	1.75E-06	2.83E-05	1.73E-06	3.17E-05	2.13E+07	4.68E+03
THYMUS	1.35E-06	2.83E-05	1.58E-06	3.17E-05	2.89E+07	6.36E+03
THYROID	1.49E-06	2.83E-05	1.69E-06	3.17E-05	3.81E+07	8.41E+03
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	2.69E-05	7.65E-04	2.82E-05	8.57E-04	1.40E+09	3.09E+05
OVARIES	6.17E-05	7.65E-04	5.00E-05	8.57E-04	6.00E+08	1.32E+05
AVERAGE	4.43E-05	7.65E-04	3.91E-05	8.57E-04	1.00E+09	2.21E+05

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	5.77E-06	3.37E-04	6.43E-06	3.78E-04	17.9	3.94E-03
ENDOST	1.05E-06	2.34E-04	1.18E-06	2.63E-04	1.81	4.00E-04
PULMNARY	6.95E-07	.0	3.32E-06	2.90E-02	20.5	4.52E-03
BREAST	5.48E-07	1.04E-05	5.95E-07	1.16E-05	13.6	3.02E-03
LIVER	1.42E-07	3.80E-05	1.60E-07	4.25E-05	4.54	1.00E-03
ST WALL	7.19E-08	1.80E-07	8.39E-08	1.04E-07	2.16	4.76E-04
PANCREAS	1.56E-07	3.15E-05	1.75E-07	3.53E-05	2.66	5.88E-04
LLI WALL	2.82E-06	1.02E-05	1.59E-06	5.43E-06	1.45	3.20E-04
KIDNEYS	4.20E-08	8.45E-06	4.57E-08	9.46E-06	.958	2.11E-04
BL WALL	3.75E-08	4.50E-06	3.46E-08	5.04E-06	.840	1.86E-04
ULI WALL	2.59E-07	1.24E-06	1.69E-07	6.72E-07	.934	2.06E-04
SI WALL	3.36E-08	8.03E-08	2.93E-08	4.48E-08	.451	9.96E-05
OVARIES	3.81E-08	4.50E-06	3.16E-08	5.04E-06	.347	7.65E-05
TESTES	1.77E-08	4.50E-06	1.86E-08	5.04E-06	.812	1.79E-04
SPLEEN	1.64E-08	4.22E-06	1.83E-08	4.73E-06	.512	1.13E-04
UTERUS	2.09E-08	4.50E-06	1.94E-08	5.04E-06	.370	8.12E-05
THYMUS	1.38E-08	4.50E-06	1.67E-08	5.04E-06	.501	1.10E-04
THYROID	8.46E-08	2.26E-06	9.60E-08	2.53E-06	3.23	7.12E-04
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	1.33E-11	2.29E-08	1.17E-11	2.56E-08	3.00E+02	6.62E-02

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : RN-222, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.0

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	.0	.0	4.29E-11	2.71E-10	2.48E+06	512.
ENDOST	.0	.0	4.84E-11	1.66E-09	2.59E+06	533.
PUL	.0	.0	2.67E-09	5.14E-08	2.00E+06	412.
MUSCLE	.0	.0	3.29E-11	4.96E-11	2.14E+06	440.
LIVER	.0	.0	9.80E-11	3.61E-10	1.85E+06	380.
S WALL	.0	.0	2.08E-10	1.40E-11	2.12E+06	436.
PANCREAS	.0	.0	6.38E-11	4.96E-11	1.19E+06	246.
LLI WALL	.0	.0	1.02E-11	2.05E-13	1.56E+06	321.
KIDNEYS	.0	.0	2.37E-10	2.22E-09	1.86E+06	383.
BL WALL	.0	.0	7.87E-12	2.48E-11	1.71E+06	352.
ULI WALL	.0	.0	4.60E-11	2.22E-12	1.74E+06	359.
SI WALL	.0	.0	8.80E-11	6.38E-12	1.56E+06	322.
OVARIES	.0	.0	1.51E-11	4.96E-11	7.96E+05	164.
TESTES	.0	.0	7.59E-12	4.96E-11	2.40E+06	494.
SPLEEN	.0	.0	9.53E-11	6.08E-10	2.27E+06	468.
UTERUS	.0	.0	1.60E-11	4.96E-11	1.44E+06	296.
THYMUS	.0	.0	8.27E-11	4.96E-11	1.31E+06	270.
THYROID	.0	.0	2.67E-11	4.96E-11	1.77E+06	365.
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	.0	.0	.0	.0	7.20E+07	1.48E+04
OVARIES	.0	.0	.0	.0	2.39E+07	4.92E+03
AVERAGE	.0	.0	.0	.0	4.79E+07	9.87E+03

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	.0	.0	1.39E-11	1.75E-09	.807	1.67E-04
ENDOST	.0	.0	1.48E-12	5.05E-10	7.97E-02	1.64E-05
PULMNARY	.0	.0	1.63E-09	3.13E-07	1.22	2.51E-04
BREAST	.0	.0	1.31E-11	1.98E-11	.854	1.76E-04
LIVER	.0	.0	1.53E-11	5.63E-10	.289	5.93E-05
ST WALL	.0	.0	1.81E-11	1.22E-11	.184	3.78E-05
PANCREAS	.0	.0	7.74E-12	6.02E-11	.145	2.99E-05
LLI WALL	.0	.0	7.07E-13	1.42E-13	.108	2.23E-05
KIDNEYS	.0	.0	8.23E-12	7.70E-10	6.45E-02	1.33E-05
BL WALL	.0	.0	2.73E-13	8.60E-12	5.93E-02	1.22E-05
ULI WALL	.0	.0	1.60E-12	7.71E-13	6.04E-02	1.25E-05
SI WALL	.0	.0	1.53E-12	1.11E-12	2.71E-02	5.59E-06
OVARIES	.0	.0	2.62E-13	8.60E-12	1.38E-02	2.85E-06
TESTES	.0	.0	1.32E-13	8.60E-12	4.16E-02	8.57E-06
SPLEEN	.0	.0	1.65E-12	1.06E-10	3.94E-02	8.12E-06
UTERUS	.0	.0	2.77E-13	8.60E-12	2.50E-02	5.14E-06
THYMUS	.0	.0	1.43E-12	8.60E-12	2.27E-02	4.68E-06
THYROID	.0	.0	2.26E-12	4.20E-12	.150	3.09E-05
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	1.44E+01	2.96E-03

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : PB-214, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	1.46E-08	1.52E-08	9.59E-09	5.70E-08	1.76E+09	3.81E+05
ENDOST	7.30E-09	1.08E-07	1.10E-08	3.68E-07	1.86E+09	4.02E+05
PUL	7.70E-09	.0	6.07E-07	.0	1.25E+09	2.68E+05
MUSCLE	1.15E-08	1.20E-09	7.21E-09	7.45E-09	1.30E+09	2.81E+05
LIVER	1.82E-08	2.00E-08	2.19E-08	7.32E-08	1.11E+09	2.39E+05
S WALL	1.40E-06	8.68E-08	4.60E-08	2.84E-09	1.11E+09	2.39E+05
PANCREAS	6.50E-08	1.20E-09	1.40E-08	7.45E-09	7.90E+08	1.69E+05
LLI WALL	5.57E-08	2.36E-09	2.16E-09	4.31E-11	8.72E+08	1.87E+05
KIDNEYS	2.86E-08	4.89E-08	5.05E-08	4.53E-07	1.09E+09	2.35E+05
BL WALL	1.32E-08	6.00E-10	1.55E-09	3.72E-09	9.80E+08	2.10E+05
ULI WALL	3.69E-07	2.44E-08	9.86E-09	4.70E-10	1.05E+09	2.25E+05
SI WALL	8.01E-07	6.12E-08	1.89E-08	1.36E-09	9.69E+08	2.08E+05
OVARIES	4.04E-08	1.20E-09	3.04E-09	7.45E-09	6.14E+08	1.32E+05
TESTES	3.02E-09	1.20E-09	1.40E-09	7.45E-09	1.61E+09	3.45E+05
SPLEEN	3.84E-08	1.13E-09	1.16E-08	7.21E-09	1.26E+09	2.70E+05
UTERUS	3.52E-08	1.20E-09	3.14E-09	7.45E-09	8.45E+08	1.81E+05
THYMUS	2.88E-09	1.20E-09	1.86E-08	7.45E-09	9.40E+08	2.02E+05
THYROID	1.06E-09	1.20E-09	5.81E-09	7.45E-09	1.23E+09	2.66E+05
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	9.05E-08	3.59E-08	4.20E-08	2.23E-07	4.83E+10	1.04E+07
OVARIES	1.21E-06	3.59E-08	9.11E-08	2.23E-07	1.84E+10	3.96E+06
AVERAGE	6.52E-07	3.59E-08	6.65E-08	2.23E-07	3.34E+10	7.16E+06

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	4.73E-09	9.72E-08	3.11E-09	3.69E-07	573.	.124
ENDOST	2.22E-10	3.20E-08	3.34E-10	1.12E-07	57.3	1.24E-02
PULMNARY	4.68E-09	.0	3.69E-07	2.82E-05	760.	.163
BREAST	4.58E-09	4.78E-10	2.88E-09	2.97E-09	519.	.112
LIVER	2.83E-09	3.11E-08	3.41E-09	1.14E-07	173.	3.73E-02
ST WALL	1.22E-07	7.53E-08	3.99E-09	2.46E-09	96.3	2.07E-02
PANCREAS	7.90E-09	1.45E-09	1.70E-09	9.04E-09	95.9	2.05E-02
LLI WALL	3.87E-09	1.64E-09	1.50E-10	2.99E-11	60.5	1.30E-02
KIDNEYS	9.94E-10	1.70E-08	1.75E-09	1.57E-07	37.8	8.16E-03
BL WALL	4.59E-10	2.08E-10	5.39E-11	1.29E-09	34.0	7.29E-03
ULI WALL	1.28E-08	8.47E-09	3.42E-10	1.63E-10	36.4	7.81E-03
SI WALL	1.39E-08	1.06E-08	3.28E-10	2.36E-10	16.8	3.61E-03
OVARIES	7.01E-10	2.08E-10	5.27E-11	1.29E-09	10.7	2.29E-03
TESTES	5.23E-11	2.08E-10	2.43E-11	1.29E-09	27.9	5.99E-03
SPLEEN	6.67E-10	1.96E-10	2.02E-10	1.25E-09	21.9	4.68E-03
UTERUS	6.11E-10	2.08E-10	5.45E-11	1.29E-09	14.7	3.14E-03
THYMUS	5.00E-11	2.08E-10	3.23E-10	1.29E-09	16.3	3.51E-03
THYROID	8.95E-11	1.01E-10	4.92E-10	6.30E-10	104.	2.25E-02
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	1.95E-13	1.08E-12	2.00E-14	6.70E-12	1.00E+04	2.14E+00

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : BI-214, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.500E-01

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	6.93E-09	1.07E-09	4.37E-09	6.52E-09	8.72E+09	1.52E+06
ENDOST	3.38E-09	1.17E-08	3.65E-09	2.67E-08	9.43E+09	1.65E+06
PUL	6.37E-09	6.00E-11	3.18E-07	.0	8.28E+09	1.44E+06
MUSCLE	7.02E-09	1.72E-10	4.41E-09	3.78E-09	8.74E+09	1.52E+06
LIVER	9.67E-09	3.33E-10	7.59E-09	3.84E-09	7.54E+09	1.31E+06
S WALL	1.06E-06	1.06E-07	1.89E-08	2.64E-09	7.92E+09	1.38E+06
PANCREAS	5.60E-08	1.72E-10	8.35E-09	3.78E-09	7.94E+09	1.36E+06
LLI WALL	1.76E-08	4.07E-10	9.08E-10	1.37E-09	6.81E+09	1.17E+06
KIDNEYS	1.69E-08	1.84E-08	4.36E-08	4.19E-07	7.04E+09	1.23E+06
BL WALL	5.89E-09	1.16E-10	8.13E-10	2.57E-09	7.40E+09	1.29E+06
ULI WALL	9.75E-08	5.95E-09	2.96E-09	1.44E-09	8.83E+09	1.51E+06
SI WALL	2.89E-07	2.81E-08	4.95E-09	1.71E-09	6.77E+09	1.17E+06
OVARIES	1.68E-08	1.72E-10	1.35E-09	3.78E-09	6.93E+09	1.17E+06
TESTES	1.44E-09	1.72E-10	6.48E-10	3.78E-09	6.74E+09	1.20E+06
SPLEEN	3.22E-08	1.66E-10	7.27E-09	3.79E-09	8.18E+09	1.44E+06
UTERUS	1.52E-08	1.72E-10	1.43E-09	3.78E-09	6.24E+09	1.08E+06
THYMUS	2.37E-09	1.72E-10	1.22E-08	3.78E-09	7.48E+09	1.27E+06
THYROID	7.26E-10	1.72E-10	3.70E-09	3.78E-09	7.87E+09	1.35E+06
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	4.31E-08	5.08E-09	1.94E-08	1.13E-07	2.02E+11	3.60E+07
OVARIES	5.03E-07	5.08E-09	4.06E-08	1.13E-07	2.08E+11	3.51E+07
AVERAGE	2.73E-07	5.08E-09	3.00E-08	1.13E-07	2.05E+11	3.56E+07

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	2.25E-09	5.53E-09	1.41E-09	4.09E-08	2.84E+03	.495
ENDOST	1.02E-10	2.60E-09	1.10E-10	7.14E-09	290.	5.08E-02
PULMNARY	3.87E-09	3.65E-10	1.93E-07	2.11E-05	5.04E+03	.876
BREAST	2.80E-09	6.77E-11	1.76E-09	1.51E-09	3.49E+03	.607
LIVER	1.51E-09	4.41E-10	1.18E-09	5.91E-09	1.18E+03	.205
ST WALL	9.21E-08	9.19E-08	1.64E-09	2.29E-09	687.	.120
PANCREAS	6.80E-09	2.06E-10	1.01E-09	4.58E-09	964.	.165
LLI WALL	1.22E-09	2.82E-10	6.30E-11	9.54E-10	473.	8.12E-02
KIDNEYS	5.85E-10	6.39E-09	1.51E-09	1.45E-07	244.	4.27E-02
BL WALL	2.04E-10	3.99E-11	2.82E-11	8.93E-10	257.	4.48E-02
ULI WALL	3.38E-09	2.07E-09	1.03E-10	5.00E-10	306.	5.24E-02
SI WALL	5.01E-09	4.88E-09	8.59E-11	2.96E-10	117.	2.03E-02
OVARIES	2.91E-10	2.94E-11	2.35E-11	6.55E-10	120.	2.03E-02
TESTES	2.49E-11	2.94E-11	1.12E-11	6.55E-10	117.	2.08E-02
SPLEEN	5.59E-10	2.85E-11	1.26E-10	6.57E-10	142.	2.50E-02
UTERUS	2.64E-10	2.94E-11	2.47E-11	6.55E-10	108.	1.87E-02
THYMUS	4.11E-11	2.94E-11	2.12E-10	6.55E-10	130.	2.20E-02
THYROID	6.14E-11	1.44E-11	3.13E-10	3.20E-10	666.	.114
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	8.19E-14	1.53E-13	9.00E-15	3.39E-12	6.15E+04	1.07E+01

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : PB-210, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	5.28E-05	1.19E-05	5.92E-05	1.61E-05	1.19E+07	3.97E+03
ENDOST	1.42E-04	2.83E-04	1.59E-04	3.18E-04	1.32E+07	4.42E+03
PUL	9.05E-08	.0	3.01E-04	5.25E-04	4.94E+06	1.66E+03
MUSCLE	1.54E-06	4.01E-06	1.78E-06	7.29E-06	6.29E+06	2.28E+03
LIVER	3.90E-05	1.06E-04	4.37E-05	1.27E-04	3.93E+06	1.28E+03
S WALL	2.04E-07	2.71E-13	1.07E-06	5.42E-09	4.19E+06	1.46E+03
PANCREAS	1.58E-06	4.01E-06	1.82E-06	7.29E-06	2.60E+06	884.
LLI WALL	1.75E-05	1.06E-08	4.04E-05	2.60E-07	2.38E+06	807.
KIDNEYS	1.82E-05	4.93E-05	2.35E-05	1.14E-04	4.36E+06	1.42E+03
BL WALL	7.61E-07	2.00E-06	8.68E-07	3.65E-06	3.09E+06	1.01E+03
ULI WALL	3.73E-06	7.55E-10	1.38E-05	7.79E-08	3.11E+06	1.01E+03
SI WALL	4.73E-07	1.02E-11	2.43E-06	1.24E-08	2.71E+06	883.
OVARIES	1.56E-06	4.01E-06	1.77E-06	7.29E-06	3.97E+06	1.32E+03
TESTES	1.50E-06	4.01E-06	1.72E-06	7.29E-06	6.72E+06	2.62E+03
SPLEEN	1.47E-06	3.81E-06	1.69E-06	8.72E-05	3.74E+06	1.23E+03
UTERUS	1.52E-06	4.01E-06	1.74E-06	7.29E-06	1.12E+06	366.
THYMUS	1.52E-06	4.01E-06	1.77E-06	7.29E-06	4.41E+06	1.44E+03
THYROID	1.53E-06	4.01E-06	1.75E-06	7.29E-06	7.34E+06	2.42E+03
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	2.93E-05	7.79E-05	3.37E-05	1.69E-04	2.02E+08	7.86E+04
OVARIES	3.05E-05	7.79E-05	3.48E-05	1.69E-04	1.19E+08	3.96E+04
AVERAGE	2.99E-05	7.79E-05	3.43E-05	1.69E-04	1.60E+08	5.91E+04

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	1.26E-05	5.81E-05	1.41E-05	8.32E-05	3.87	1.29E-03
ENDOST	3.11E-06	6.15E-05	3.47E-06	6.91E-05	.406	1.36E-04
PULMNARY	3.59E-08	.0	1.83E-04	3.19E-03	3.01	1.01E-03
BREAST	4.36E-07	1.13E-06	5.06E-07	2.36E-06	2.51	9.10E-04
LIVER	4.33E-06	1.17E-04	4.84E-06	1.44E-04	.614	2.00E-04
ST WALL	1.64E-08	2.35E-13	9.02E-08	4.63E-09	.364	1.27E-04
PANCREAS	1.36E-07	3.45E-06	1.57E-07	7.17E-06	.316	1.07E-04
LLI WALL	1.22E-06	7.34E-09	2.77E-06	1.78E-07	.165	5.60E-05
KIDNEYS	4.51E-07	1.21E-05	6.08E-07	3.36E-05	.151	4.93E-05
BL WALL	1.88E-08	4.93E-07	2.15E-08	1.02E-06	.107	3.50E-05
ULI WALL	1.29E-07	2.62E-10	4.73E-07	2.66E-08	.108	3.50E-05
SI WALL	7.83E-09	1.76E-12	4.14E-08	2.12E-09	4.70E-02	1.53E-05
OVARIES	1.93E-08	4.93E-07	2.19E-08	1.02E-06	6.89E-02	2.29E-05
TESTES	1.85E-08	4.93E-07	2.13E-08	1.02E-06	.117	4.55E-05
SPLEEN	1.81E-08	4.70E-07	2.10E-08	1.46E-05	6.49E-02	2.13E-05
UTERUS	1.88E-08	4.93E-07	2.15E-08	1.02E-06	1.94E-02	6.35E-06
THYMUS	1.88E-08	4.93E-07	2.20E-08	1.02E-06	7.65E-02	2.50E-05
THYROID	9.99E-08	2.63E-07	1.15E-07	5.27E-07	.621	2.05E-04
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	8.97E-12	2.34E-09	1.03E-11	5.08E-09	4.81E+01	1.77E-02

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : PO-210, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.100E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	1.91E-11	2.66E-05	3.90E-11	4.10E-05	4.87E+04	9.45
ENDOST	1.21E-11	1.22E-05	2.91E-11	1.89E-05	5.26E+04	10.2
PUL	1.15E-11	.0	3.26E-10	3.92E-03	4.33E+04	8.40
MUSCLE	1.43E-11	2.63E-05	3.51E-11	4.05E-05	4.62E+04	8.95
LIVER	3.14E-11	8.15E-05	7.57E-11	1.26E-04	3.93E+04	7.62
S WALL	2.64E-11	2.26E-07	5.59E-11	1.11E-07	4.11E+04	7.97
PANCREAS	3.76E-11	2.63E-05	8.49E-11	4.05E-05	3.85E+04	7.46
LLI WALL	7.89E-11	9.01E-06	5.02E-11	4.42E-06	3.08E+04	5.97
KIDNEYS	7.50E-11	4.72E-04	1.24E-10	7.28E-04	4.25E+04	8.24
BL WALL	1.92E-11	1.31E-05	2.15E-11	2.03E-05	4.00E+04	7.75
ULI WALL	5.31E-11	3.00E-06	4.47E-11	1.47E-06	4.02E+04	7.80
SI WALL	4.11E-11	5.08E-07	3.67E-11	2.49E-07	3.50E+04	6.79
OVARIES	4.27E-11	2.63E-05	3.64E-11	4.05E-05	2.38E+04	4.62
TESTES	1.08E-11	2.63E-05	1.42E-11	4.05E-05	4.49E+04	8.70
SPLEEN	1.15E-10	8.15E-04	2.02E-10	1.26E-03	4.69E+04	9.09
UTERUS	3.51E-11	2.63E-05	4.26E-11	4.05E-05	3.18E+04	6.17
THYMUS	1.54E-11	2.63E-05	7.40E-11	4.05E-05	3.03E+04	5.87
THYROID	8.16E-12	2.63E-05	2.95E-11	4.05E-05	3.52E+04	6.82
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	3.23E-10	7.84E-04	4.24E-10	1.21E-03	1.35E+06	261.
OVARIES	1.28E-09	7.84E-04	1.09E-09	1.21E-03	7.14E+05	139.
AVERAGE	8.01E-10	7.84E-04	7.55E-10	1.21E-03	1.03E+06	200.

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	6.23E-12	1.73E-04	1.27E-11	2.67E-04	1.59E-02	3.08E-06
ENDOST	3.73E-13	3.77E-06	8.95E-13	5.80E-06	1.62E-03	3.14E-07
PULMNARY	6.97E-12	.0	1.98E-10	2.38E-02	2.63E-02	5.11E-06
BREAST	5.70E-12	1.05E-05	1.40E-11	1.61E-05	1.84E-02	3.57E-06
LIVER	4.90E-12	1.27E-04	1.18E-11	1.96E-04	6.14E-03	1.19E-06
ST WALL	2.29E-12	1.96E-07	4.84E-12	9.60E-08	3.57E-03	6.91E-07
PANCREAS	4.57E-12	3.19E-05	1.03E-11	4.91E-05	4.68E-03	9.06E-07
LLI WALL	5.47E-12	6.25E-06	3.48E-12	3.06E-06	2.14E-03	4.14E-07
KIDNEYS	2.60E-12	1.64E-04	4.30E-12	2.52E-04	1.47E-03	2.86E-07
BL WALL	6.67E-13	4.56E-06	7.43E-13	7.01E-06	1.39E-03	2.69E-07
ULI WALL	1.84E-12	1.04E-06	1.55E-12	5.09E-07	1.40E-03	2.71E-07
SI WALL	7.14E-13	8.82E-08	6.36E-13	4.31E-08	6.07E-04	1.18E-07
OVARIES	7.41E-13	4.56E-06	6.30E-13	7.01E-06	4.13E-04	8.02E-08
TESTES	1.88E-13	4.56E-06	2.46E-13	7.01E-06	7.79E-04	1.51E-07
SPLEEN	2.00E-12	1.41E-04	3.50E-12	2.17E-04	8.14E-04	1.58E-07
UTERUS	6.09E-13	4.56E-06	7.38E-13	7.01E-06	5.52E-04	1.07E-07
THYMUS	2.67E-13	4.56E-06	1.28E-12	7.01E-06	5.26E-04	1.02E-07
THYROID	6.91E-13	2.22E-06	2.50E-12	3.42E-06	2.98E-03	5.77E-07
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	2.40E-16	2.35E-08	2.26E-16	3.63E-08	3.09E-01	6.00E-05

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : TH-232, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.200E-03

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	9.24E-08	5.22E-05	5.54E-05	1.41E-02	1.40E+06	455.
ENDOST	2.50E-07	9.30E-04	9.91E-05	.243	1.54E+06	511.
PUL	6.82E-09	4.29E-11	5.84E-03	4.22E-02	6.72E+05	209.
MUSCLE	8.80E-09	1.99E-07	2.81E-05	9.18E-05	7.91E+05	389.
LIVER	9.44E-09	9.49E-07	4.81E-05	3.56E-04	5.55E+05	145.
S WALL	5.18E-08	1.70E-07	4.01E-05	2.67E-07	5.39E+05	178.
PANCREAS	8.21E-09	1.99E-07	4.68E-05	9.18E-05	4.09E+05	131.
LLI WALL	2.15E-06	7.57E-06	3.40E-05	9.48E-06	3.97E+05	138.
KIDNEYS	8.46E-09	1.88E-07	2.19E-05	8.82E-05	5.56E+05	145.
BL WALL	5.00E-09	9.95E-08	4.24E-06	4.59E-05	4.69E+05	121.
ULI WALL	7.14E-07	2.52E-06	2.90E-05	3.35E-06	4.63E+05	120.
SI WALL	1.31E-07	4.27E-07	1.52E-05	5.84E-07	4.50E+05	116.
OVARIES	1.33E-08	1.99E-07	8.14E-06	9.18E-05	4.31E+05	131.
TESTES	6.08E-09	1.99E-07	3.85E-06	9.18E-05	8.78E+05	477.
SPLEEN	6.72E-09	1.88E-07	4.22E-05	8.70E-05	5.10E+05	144.
UTERUS	7.41E-09	1.99E-07	7.07E-06	9.18E-05	2.51E+05	62.5
THYMUS	6.31E-09	1.99E-07	7.63E-05	9.18E-05	4.97E+05	130.
THYROID	5.79E-09	1.99E-07	2.43E-05	9.18E-05	9.11E+05	253.
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	7.86E-08	5.41E-06	4.35E-05	1.58E-03	2.63E+07	1.43E+04
OVARIES	2.64E-07	5.41E-06	1.13E-04	1.58E-03	1.29E+07	3.93E+03
AVERAGE	1.72E-07	5.41E-06	7.83E-05	1.58E-03	1.96E+07	9.12E+03

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	1.77E-08	2.14E-04	1.05E-05	5.26E-02	.456	1.48E-04
ENDOST	4.33E-09	1.73E-04	1.63E-06	4.06E-02	4.74E-02	1.57E-05
PULMNARY	1.88E-09	2.61E-10	1.85E-03	.242	.409	1.27E-04
BREAST	1.74E-09	7.29E-08	5.52E-06	2.31E-05	.316	1.55E-04
LIVER	9.62E-10	1.36E-06	3.76E-06	3.75E-04	8.67E-02	2.26E-05
ST WALL	4.31E-09	1.48E-07	1.85E-06	2.09E-07	4.68E-02	1.54E-05
PANCREAS	5.04E-10	2.22E-07	2.82E-06	7.04E-05	4.97E-02	1.59E-05
LLI WALL	1.49E-07	5.25E-06	1.91E-06	6.00E-06	2.76E-02	9.58E-06
KIDNEYS	1.46E-10	5.98E-08	3.77E-07	1.93E-05	1.93E-02	5.03E-06
BL WALL	9.78E-11	3.17E-08	7.39E-08	1.01E-05	1.63E-02	4.20E-06
ULI WALL	2.47E-08	8.74E-07	7.44E-07	1.06E-06	1.61E-02	4.16E-06
SI WALL	2.21E-09	7.40E-08	1.74E-07	9.19E-08	7.81E-03	2.01E-06
OVARIES	1.65E-10	3.17E-08	7.56E-08	1.01E-05	7.48E-03	2.27E-06
TESTES	5.49E-11	3.17E-08	3.11E-08	1.01E-05	1.52E-02	8.28E-06
SPLEEN	5.97E-11	3.00E-08	3.64E-07	9.52E-06	8.85E-03	2.50E-06
UTERUS	7.45E-11	3.17E-08	6.27E-08	1.01E-05	4.36E-03	1.08E-06
THYMUS	5.63E-11	3.17E-08	6.59E-07	1.01E-05	8.62E-03	2.26E-06
THYROID	2.95E-10	1.59E-08	1.21E-06	5.54E-06	7.71E-02	2.14E-05
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	5.16E-14	1.62E-10	2.36E-11	4.74E-08	5.89E+00	2.73E-03

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : RA-228, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	1.76E-05	3.01E-05	2.26E-05	4.08E-05	2.49E-02	5.10E-05
ENDOST	3.38E-05	3.02E-04	4.12E-05	4.16E-04	3.08E-02	6.31E-05
PUL	2.03E-06	.0	4.75E-04	3.82E-04	1.68E-02	3.45E-05
MUSCLE	4.68E-06	2.04E-05	7.64E-06	2.75E-05	6.97E-02	1.43E-04
LIVER	4.41E-06	1.94E-05	9.64E-06	3.74E-05	1.80E-04	3.68E-07
S WALL	2.15E-06	9.94E-13	8.82E-06	2.51E-08	4.23E-02	8.68E-05
PANCREAS	5.03E-06	2.04E-05	1.00E-05	2.75E-05	1.21E-02	2.47E-05
LLI WALL	7.07E-05	2.08E-08	5.07E-05	9.31E-07	6.97E-03	1.43E-05
KIDNEYS	4.87E-06	1.94E-05	7.41E-06	2.62E-05	2.45E-05	5.01E-08
BL WALL	3.56E-06	1.02E-05	4.00E-06	1.37E-05	2.94E-09	6.03E-12
ULI WALL	2.16E-05	1.81E-09	2.68E-05	3.18E-07	6.00E-05	1.23E-07
SI WALL	5.49E-06	3.58E-11	1.07E-05	5.31E-08	3.28E-05	6.73E-08
OVARIES	6.98E-06	2.04E-05	7.64E-06	2.75E-05	8.99E-03	1.84E-05
TESTES	4.15E-06	2.04E-05	4.74E-06	2.75E-05	.150	3.07E-04
SPLEEN	4.43E-06	1.94E-05	8.85E-06	2.60E-05	4.23E-03	8.68E-06
UTERUS	6.40E-06	2.04E-05	7.43E-06	2.75E-05	1.68E-06	3.43E-09
THYMUS	4.80E-06	2.04E-05	1.27E-05	2.75E-05	2.49E-06	5.10E-09
THYROID	3.89E-06	2.04E-05	6.63E-06	2.75E-05	8.47E-03	1.74E-05
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	1.14E-04	5.53E-04	1.30E-04	7.46E-04	4.50	9.21E-03
OVARIES	1.97E-04	5.53E-04	2.15E-04	7.46E-04	.270	5.52E-04
AVERAGE	1.56E-04	5.53E-04	1.72E-04	7.46E-04	2.38	4.88E-03

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	5.27E-06	1.82E-04	6.82E-06	2.48E-04	8.11E-09	1.66E-11
ENDOST	9.41E-07	8.02E-05	1.15E-06	1.12E-04	9.48E-10	1.94E-12
PULMNARY	1.10E-06	.0	2.89E-04	2.32E-03	1.02E-08	2.10E-11
BREAST	1.72E-06	7.45E-06	2.88E-06	1.00E-05	2.78E-08	5.71E-11
LIVER	6.41E-07	2.76E-05	1.45E-06	5.40E-05	2.81E-11	5.75E-14
ST WALL	1.74E-07	8.63E-13	7.47E-07	2.13E-08	3.67E-09	7.53E-12
PANCREAS	5.66E-07	2.27E-05	1.17E-06	3.05E-05	1.47E-09	3.00E-12
LLI WALL	4.89E-06	1.44E-08	3.48E-06	6.32E-07	4.84E-10	9.92E-13
KIDNEYS	1.57E-07	6.14E-06	2.42E-07	8.32E-06	8.50E-13	1.74E-15
BL WALL	1.16E-07	3.24E-06	1.30E-07	4.37E-06	1.02E-16	2.09E-19
ULI WALL	7.42E-07	6.29E-10	9.16E-07	1.08E-07	2.08E-12	4.27E-15
SI WALL	9.19E-08	6.21E-12	1.81E-07	9.00E-09	5.69E-13	1.17E-15
OVARIES	1.15E-07	3.24E-06	1.25E-07	4.36E-06	1.56E-10	3.19E-13
TESTES	6.70E-08	3.24E-06	7.62E-08	4.36E-06	2.60E-09	5.33E-12
SPLEEN	7.14E-08	3.07E-06	1.47E-07	4.14E-06	7.34E-11	1.51E-13
UTERUS	1.05E-07	3.24E-06	1.21E-07	4.36E-06	2.92E-14	5.95E-17
THYMUS	7.75E-08	3.24E-06	2.13E-07	4.36E-06	4.32E-14	8.85E-17
THYROID	3.14E-07	1.63E-06	5.43E-07	2.20E-06	7.17E-10	1.47E-12
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	4.68E-11	1.67E-08	5.16E-11	2.24E-08	7.16E-07	1.46E-09

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : AC-228, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.100E-02

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	1.22E-07	9.47E-09	8.38E-08	2.26E-06	5.41E+09	1.02E+06
ENDOST	4.26E-08	1.10E-07	1.01E-07	2.60E-05	5.85E+09	1.11E+06
PUL	2.59E-08	1.95E-14	3.62E-06	3.28E-06	4.82E+09	9.04E+05
MUSCLE	8.14E-08	1.70E-10	5.19E-08	5.72E-08	5.11E+09	9.59E+05
LIVER	9.92E-08	1.35E-08	2.79E-07	1.61E-06	4.34E+09	8.14E+05
S WALL	2.08E-06	8.80E-12	3.50E-07	2.37E-10	4.48E+09	8.39E+05
PANCREAS	1.78E-07	1.70E-10	9.70E-08	5.72E-08	4.49E+09	8.37E+05
LLI WALL	6.16E-06	7.00E-09	9.12E-07	1.02E-08	3.54E+09	6.61E+05
KIDNEYS	1.37E-07	1.65E-10	5.71E-08	5.51E-08	4.49E+09	8.45E+05
BL WALL	1.44E-07	8.52E-11	2.68E-08	2.86E-08	4.42E+09	8.28E+05
ULI WALL	8.05E-06	1.33E-09	1.17E-06	3.24E-09	4.64E+09	8.65E+05
SI WALL	3.74E-06	8.78E-11	5.49E-07	5.15E-10	3.90E+09	7.32E+05
OVARIES	5.15E-07	1.70E-10	8.49E-08	5.72E-08	3.20E+09	5.90E+05
TESTES	3.75E-08	1.70E-10	1.13E-08	5.72E-08	4.73E+09	9.00E+05
SPLEEN	1.19E-07	1.61E-10	7.62E-08	5.42E-08	5.12E+09	9.59E+05
UTERUS	2.98E-07	1.70E-10	5.28E-08	5.72E-08	3.51E+09	6.58E+05
THYMUS	1.08E-08	1.70E-10	1.09E-07	5.72E-08	3.71E+09	6.90E+05
THYROID	3.32E-09	1.70E-10	3.61E-08	5.72E-08	4.19E+09	7.86E+05
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	1.12E-06	4.89E-09	3.35E-07	1.63E-06	1.42E+11	2.70E+07
OVARIES	1.54E-05	4.89E-09	2.54E-06	1.63E-06	9.60E+10	1.77E+07
AVERAGE	8.28E-06	4.89E-09	1.44E-06	1.63E-06	1.19E+11	2.24E+07

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	3.97E-08	5.92E-08	2.71E-08	1.41E-05	1.76E+03	.332
ENDOST	1.31E-09	3.23E-08	3.08E-09	7.62E-06	180.	3.42E-02
PULMNARY	1.57E-08	1.19E-13	2.20E-06	1.99E-05	2.93E+03	.550
BREAST	3.25E-08	6.55E-11	2.07E-08	2.18E-08	2.04E+03	.383
LIVER	1.55E-08	2.03E-08	4.35E-08	2.42E-06	678.	.127
ST WALL	1.80E-07	7.63E-12	3.04E-08	2.04E-10	389.	7.28E-02
PANCREAS	2.17E-08	1.99E-10	1.18E-08	6.64E-08	545.	.102
LLI WALL	4.28E-07	4.86E-09	6.33E-08	7.05E-09	246.	4.59E-02
KIDNEYS	4.77E-09	5.52E-11	1.98E-09	1.83E-08	156.	2.93E-02
BL WALL	5.00E-09	2.85E-11	9.27E-10	9.50E-09	153.	2.87E-02
ULI WALL	2.79E-07	4.62E-10	4.07E-08	1.12E-09	161.	3.00E-02
SI WALL	6.49E-08	1.52E-11	9.52E-09	8.85E-11	67.7	1.27E-02
OVARIES	8.93E-09	2.85E-11	1.47E-09	9.49E-09	55.5	1.02E-02
TESTES	6.50E-10	2.85E-11	1.94E-10	9.49E-09	82.1	1.56E-02
SPLEEN	2.07E-09	2.70E-11	1.32E-09	9.00E-09	88.8	1.66E-02
UTERUS	5.16E-09	2.85E-11	9.14E-10	9.49E-09	60.9	1.14E-02
THYMUS	1.88E-10	2.85E-11	1.89E-09	9.49E-09	64.4	1.20E-02
THYROID	2.81E-10	1.41E-11	3.05E-09	4.71E-09	355.	6.65E-02
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	2.49E-12	1.47E-13	4.32E-13	4.89E-11	3.57E+04	6.70E+00

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : TH-228, RESP CLEARANCE CLASS=Y, PARTICLE SIZE=1.0 AMAD, F1=0.200E-03

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	2.27E-07	1.17E-05	1.52E-05	1.13E-03	1.68E+07	3.98E+03
ENDOST	2.05E-07	1.33E-04	2.04E-05	1.29E-02	1.81E+07	4.32E+03
PUL	1.75E-08	7.32E-11	1.44E-03	6.21E-02	9.28E+06	2.17E+03
MUSCLE	9.50E-08	3.33E-07	7.94E-06	3.23E-05	9.69E+06	2.44E+03
LIVER	6.37E-08	1.20E-06	1.45E-05	1.26E-04	8.02E+06	1.84E+03
S WALL	1.93E-07	2.36E-07	1.77E-05	3.55E-06	7.10E+06	1.67E+03
PANCREAS	6.26E-08	3.33E-07	1.22E-05	3.23E-05	5.81E+06	1.36E+03
LLI WALL	3.44E-05	2.20E-05	3.91E-04	1.19E-04	5.70E+06	1.35E+03
KIDNEYS	7.92E-08	3.43E-07	7.68E-06	3.99E-05	7.75E+06	1.78E+03
BL WALL	2.62E-07	1.67E-07	4.91E-06	1.61E-05	6.93E+06	1.59E+03
ULI WALL	4.62E-06	5.08E-06	1.31E-04	4.30E-05	7.02E+06	1.61E+03
SI WALL	7.45E-07	6.39E-07	2.73E-05	7.39E-06	6.92E+06	1.59E+03
OVARIES	7.91E-07	3.33E-07	1.41E-05	3.23E-05	5.28E+06	1.23E+03
TESTES	9.75E-08	3.33E-07	2.55E-06	3.23E-05	1.18E+07	2.98E+03
SPLEEN	6.31E-08	3.18E-07	1.09E-05	3.08E-05	7.57E+06	1.74E+03
UTERUS	2.88E-07	3.33E-07	6.79E-06	3.23E-05	4.91E+06	1.12E+03
THYMUS	1.71E-08	3.33E-07	1.70E-05	3.23E-05	7.04E+06	1.61E+03
THYROID	1.11E-08	3.33E-07	5.28E-06	3.23E-05	1.18E+07	2.74E+03
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	2.91E-06	9.68E-06	7.19E-05	8.92E-04	3.54E+08	8.94E+04
OVARIES	2.37E-05	9.68E-06	4.05E-04	8.92E-04	1.58E+08	3.69E+04
AVERAGE	1.33E-05	9.68E-06	2.38E-04	8.92E-04	2.56E+08	6.32E+04

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	7.29E-08	7.31E-05	4.70E-06	6.90E-03	5.47	1.30E-03
ENDOST	6.12E-09	3.91E-05	5.91E-07	3.67E-03	.557	1.33E-04
PULMNARY	1.04E-08	4.45E-10	8.16E-04	.367	5.65	1.32E-03
BREAST	3.77E-08	1.29E-07	2.94E-06	1.19E-05	3.87	9.74E-04
LIVER	9.82E-09	1.82E-06	2.10E-06	1.81E-04	1.25	2.87E-04
ST WALL	1.68E-08	2.05E-07	1.44E-06	2.93E-06	.616	1.45E-04
PANCREAS	7.55E-09	3.94E-07	1.37E-06	3.62E-05	.706	1.65E-04
LLI WALL	2.38E-06	1.53E-05	2.58E-05	7.90E-05	.396	9.37E-05
KIDNEYS	2.73E-09	1.16E-07	2.49E-07	1.29E-05	.269	6.18E-05
BL WALL	9.09E-09	5.63E-08	1.61E-07	5.17E-06	.240	5.52E-05
ULI WALL	1.60E-07	1.76E-06	4.33E-06	1.42E-05	.244	5.59E-05
SI WALL	1.29E-08	1.11E-07	4.49E-07	1.22E-06	.120	2.76E-05
OVARIES	1.37E-08	5.63E-08	2.32E-07	5.17E-06	9.16E-02	2.13E-05
TESTES	1.68E-09	5.63E-08	4.14E-08	5.17E-06	.205	5.17E-05
SPLEEN	1.09E-09	5.38E-08	1.76E-07	4.94E-06	.131	3.02E-05
UTERUS	4.98E-09	5.63E-08	1.11E-07	5.17E-06	8.52E-02	1.94E-05
THYMUS	2.90E-10	5.63E-08	2.73E-07	5.17E-06	.122	2.79E-05
THYROID	9.26E-10	2.77E-08	4.26E-07	2.59E-06	.999	2.32E-04
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	3.99E-12	2.91E-10	7.16E-11	2.67E-08	7.68E+01	1.89E-02

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : RA-224, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	8.41E-07	2.06E-05	4.77E-07	1.54E-05	7.61E+07	1.66E+04
ENDOST	7.41E-07	1.78E-04	5.10E-07	1.33E-04	8.06E+07	1.76E+04
PUL	8.77E-08	.0	7.35E-06	6.14E-04	5.04E+07	1.10E+04
MUSCLE	4.06E-07	2.89E-06	2.36E-07	2.16E-06	5.17E+07	1.13E+04
LIVER	4.91E-07	4.16E-06	3.47E-07	2.96E-06	4.40E+07	9.58E+03
S WALL	5.97E-07	7.89E-07	4.94E-07	3.08E-07	3.99E+07	8.69E+03
PANCREAS	3.59E-07	2.89E-06	2.59E-07	2.16E-06	3.24E+07	7.06E+03
LLI WALL	9.03E-05	2.86E-05	3.47E-05	1.07E-05	3.28E+07	7.16E+03
KIDNEYS	5.07E-07	3.59E-06	3.31E-07	2.93E-06	4.21E+07	9.18E+03
BL WALL	8.91E-07	1.44E-06	3.78E-07	1.08E-06	3.69E+07	8.05E+03
ULI WALL	2.40E-05	1.02E-05	1.01E-05	3.86E-06	4.15E+07	9.04E+03
SI WALL	3.25E-06	1.66E-06	1.61E-06	6.42E-07	3.92E+07	8.53E+03
OVARIES	2.73E-06	2.89E-06	1.12E-06	2.16E-06	2.80E+07	6.11E+03
TESTES	3.81E-07	2.89E-06	1.88E-07	2.16E-06	6.99E+07	1.52E+04
SPLEEN	3.16E-07	2.76E-06	2.27E-07	2.07E-06	4.75E+07	1.03E+04
UTERUS	1.12E-06	2.89E-06	5.02E-07	2.16E-06	3.37E+07	7.34E+03
THYMUS	1.58E-07	2.89E-06	2.13E-07	2.16E-06	4.25E+07	9.25E+03
THYROID	1.10E-07	2.89E-06	1.07E-07	2.16E-06	5.26E+07	1.15E+04
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	1.14E-05	8.66E-05	5.64E-06	6.48E-05	2.10E+09	4.56E+05
OVARIES	8.19E-05	8.66E-05	3.37E-05	6.48E-05	8.40E+08	1.83E+05
AVERAGE	4.67E-05	8.66E-05	1.97E-05	6.48E-05	1.47E+09	3.20E+05

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	2.74E-07	1.34E-04	1.55E-07	1.00E-04	24.8	5.40E-03
ENDOST	2.28E-08	5.49E-05	1.57E-08	4.09E-05	2.48	5.42E-04
PULMNARY	5.34E-08	.0	4.47E-06	3.73E-03	30.7	6.69E-03
BREAST	1.62E-07	1.15E-06	9.40E-08	8.63E-07	20.6	4.51E-03
LIVER	7.67E-08	6.50E-06	5.42E-08	4.63E-06	6.87	1.50E-03
ST WALL	5.18E-08	6.84E-07	4.28E-08	2.67E-07	3.46	7.54E-04
PANCREAS	4.36E-08	3.51E-06	3.15E-08	2.63E-06	3.94	8.58E-04
LLI WALL	6.26E-06	1.98E-05	2.41E-06	7.41E-06	2.28	4.97E-04
KIDNEYS	1.76E-08	1.25E-06	1.15E-08	1.02E-06	1.46	3.19E-04
BL WALL	3.09E-08	5.01E-07	1.31E-08	3.75E-07	1.28	2.79E-04
ULI WALL	8.33E-07	3.54E-06	3.49E-07	1.34E-06	1.44	3.14E-04
SI WALL	5.65E-08	2.87E-07	2.79E-08	1.11E-07	.680	1.48E-04
OVARIES	4.74E-08	5.01E-07	1.95E-08	3.75E-07	.486	1.06E-04
TESTES	6.61E-09	5.01E-07	3.26E-09	3.75E-07	1.21	2.64E-04
SPLEEN	5.49E-09	4.79E-07	3.94E-09	3.58E-07	.824	1.79E-04
UTERUS	1.94E-08	5.01E-07	8.71E-09	3.75E-07	.585	1.27E-04
THYMUS	2.74E-09	5.01E-07	3.70E-09	3.75E-07	.737	1.61E-04
THYROID	9.31E-09	2.45E-07	9.05E-09	1.83E-07	4.45	9.74E-04
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	1.40E-11	2.59E-09	5.91E-12	1.95E-09	4.41E+02	9.59E-02

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : PB-212, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.200E+00

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	4.76E-07	3.64E-06	2.67E-07	2.45E-06	1.15E+09	2.57E+05
ENDOST	4.80E-07	2.73E-05	3.29E-07	1.79E-05	1.23E+09	2.75E+05
PUL	7.63E-08	.0	1.14E-05	9.73E-05	7.25E+08	1.61E+05
MUSCLE	2.21E-07	2.08E-07	1.46E-07	1.90E-07	7.49E+08	1.66E+05
LIVER	9.06E-07	5.23E-06	6.39E-07	3.42E-06	6.32E+08	1.40E+05
S WALL	2.31E-06	1.27E-07	8.89E-07	5.57E-08	5.75E+08	1.27E+05
PANCREAS	3.25E-07	2.08E-07	2.47E-07	1.90E-07	4.62E+08	1.02E+05
LLI WALL	2.49E-05	2.12E-06	4.93E-06	4.18E-07	4.67E+08	1.03E+05
KIDNEYS	7.05E-07	3.30E-06	8.59E-07	6.96E-06	6.08E+08	1.35E+05
BL WALL	3.80E-07	1.04E-07	1.02E-07	9.47E-08	5.34E+08	1.18E+05
ULI WALL	2.16E-05	1.76E-06	4.40E-06	3.56E-07	5.85E+08	1.29E+05
SI WALL	6.40E-06	4.57E-07	1.48E-06	1.10E-07	5.55E+08	1.23E+05
OVARIES	1.27E-06	2.08E-07	3.00E-07	1.90E-07	4.06E+08	9.02E+04
TESTES	1.56E-07	2.08E-07	6.06E-08	1.90E-07	9.78E+08	2.16E+05
SPLEEN	2.27E-07	1.96E-07	2.04E-07	1.78E-07	6.64E+08	1.47E+05
UTERUS	6.35E-07	2.08E-07	1.77E-07	1.90E-07	4.55E+08	1.00E+05
THYMUS	8.88E-08	2.08E-07	2.58E-07	1.90E-07	5.95E+08	1.31E+05
THYROID	5.47E-08	2.08E-07	9.20E-08	1.90E-07	7.98E+08	1.78E+05
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	4.68E-06	6.24E-06	1.82E-06	5.69E-06	2.93E+10	6.48E+06
OVARIES	3.82E-05	6.24E-06	9.01E-06	5.69E-06	1.22E+10	2.71E+06
AVERAGE	2.15E-05	6.24E-06	5.41E-06	5.69E-06	2.08E+10	4.59E+06

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	1.55E-07	2.37E-05	8.69E-08	1.59E-05	374.	8.37E-02
ENDOST	1.48E-08	8.40E-06	1.01E-08	5.52E-06	37.9	8.46E-03
PULMNARY	4.64E-08	.0	6.92E-06	5.92E-04	440.	9.79E-02
BREAST	8.83E-08	8.30E-08	5.84E-08	7.56E-08	298.	6.62E-02
LIVER	1.42E-07	8.16E-06	9.98E-08	5.35E-06	98.6	2.19E-02
ST WALL	2.01E-07	1.10E-07	7.72E-08	4.84E-08	49.9	1.10E-02
PANCREAS	3.95E-08	2.53E-07	3.00E-08	2.30E-07	56.1	1.24E-02
LLI WALL	1.73E-06	1.47E-06	3.42E-07	2.90E-07	32.4	7.15E-03
KIDNEYS	2.45E-08	1.15E-06	2.98E-08	2.42E-06	21.1	4.68E-03
BL WALL	1.32E-08	3.61E-08	3.54E-09	3.29E-08	18.5	4.09E-03
ULI WALL	7.48E-07	6.09E-07	1.53E-07	1.24E-07	20.3	4.48E-03
SI WALL	1.11E-07	7.93E-08	2.57E-08	1.91E-08	9.63	2.13E-03
OVARIES	2.21E-08	3.61E-08	5.21E-09	3.29E-08	7.04	1.57E-03
TESTES	2.70E-09	3.61E-08	1.05E-09	3.29E-08	17.0	3.75E-03
SPLEEN	3.93E-09	3.40E-08	3.53E-09	3.10E-08	11.5	2.55E-03
UTERUS	1.10E-08	3.61E-08	3.08E-09	3.29E-08	7.89	1.74E-03
THYMUS	1.54E-09	3.61E-08	4.48E-09	3.29E-08	10.3	2.27E-03
THYROID	4.63E-09	1.76E-08	7.79E-09	1.60E-08	67.5	1.51E-02
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	6.44E-12	1.88E-10	1.62E-12	1.71E-10	6.23E+03	1.38E+00

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : BI-212, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.500E-01

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	2.43E-08	3.34E-09	1.25E-08	2.35E-08	1.08E+09	2.00E+05
ENDOST	1.24E-08	9.66E-09	1.00E-08	6.80E-08	1.15E+09	2.14E+05
PUL	1.29E-08	7.98E-10	9.87E-07	1.06E-05	9.78E+08	1.80E+05
MUSCLE	2.08E-08	2.23E-09	1.24E-08	1.57E-08	1.04E+09	1.92E+05
LIVER	2.79E-08	2.15E-09	2.04E-08	1.51E-08	8.85E+08	1.63E+05
S WALL	1.95E-06	1.98E-07	8.49E-08	1.23E-08	9.43E+08	1.74E+05
PANCREAS	9.57E-08	2.23E-09	2.37E-08	1.57E-08	8.64E+08	1.58E+05
LLI WALL	1.72E-07	1.40E-08	8.14E-09	6.06E-09	7.66E+08	1.40E+05
KIDNEYS	7.68E-08	2.51E-07	1.81E-07	1.76E-06	8.75E+08	1.63E+05
BL WALL	2.29E-08	1.51E-09	3.54E-09	1.06E-08	8.89E+08	1.64E+05
ULI WALL	8.74E-07	7.77E-08	3.53E-08	8.24E-09	9.71E+08	1.78E+05
SI WALL	1.23E-06	1.30E-07	4.68E-08	1.00E-08	7.91E+08	1.46E+05
OVARIES	7.08E-08	2.23E-09	6.52E-09	1.57E-08	6.87E+08	1.23E+05
TESTES	8.85E-09	2.23E-09	2.96E-09	1.57E-08	9.14E+08	1.71E+05
SPLEEN	5.77E-08	2.15E-09	2.15E-08	1.51E-08	1.04E+09	1.93E+05
UTERUS	5.72E-08	2.23E-09	6.59E-09	1.57E-08	7.18E+08	1.32E+05
THYMUS	9.85E-09	2.23E-09	3.01E-08	1.57E-08	7.86E+08	1.43E+05
THYROID	5.17E-09	2.23E-09	1.01E-08	1.57E-08	8.81E+08	1.61E+05
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	2.65E-07	6.68E-08	8.88E-08	4.70E-07	2.74E+10	5.13E+06
OVARIES	2.12E-06	6.68E-08	1.95E-07	4.70E-07	2.06E+10	3.69E+06
AVERAGE	1.19E-06	6.68E-08	1.42E-07	4.70E-07	2.40E+10	4.41E+06

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	7.92E-09	2.18E-08	4.08E-09	1.53E-07	352.	6.51E-02
ENDOST	3.82E-10	2.97E-09	3.09E-10	2.09E-08	35.4	6.59E-03
PULMNARY	7.88E-09	4.86E-09	6.00E-07	6.44E-05	593.	.110
BREAST	8.30E-09	8.89E-10	4.96E-09	6.25E-09	415.	7.66E-02
LIVER	4.36E-09	3.36E-09	3.19E-09	2.36E-08	138.	2.55E-02
ST WALL	1.70E-07	1.72E-07	7.36E-09	1.07E-08	81.8	1.51E-02
PANCREAS	1.16E-08	2.71E-09	2.88E-09	1.90E-08	105.	1.92E-02
LLI WALL	1.19E-08	9.72E-09	5.65E-10	4.21E-09	53.1	9.72E-03
KIDNEYS	2.67E-09	8.69E-08	6.29E-09	6.11E-07	30.4	5.66E-03
BL WALL	7.95E-10	5.25E-10	1.23E-10	3.69E-09	30.8	5.69E-03
ULI WALL	3.03E-08	2.70E-08	1.23E-09	2.86E-09	33.7	6.18E-03
SI WALL	2.13E-08	2.26E-08	8.12E-10	1.74E-09	13.7	2.53E-03
OVARIES	1.23E-09	3.87E-10	1.13E-10	2.72E-09	11.9	2.13E-03
TESTES	1.54E-10	3.87E-10	5.13E-11	2.72E-09	15.9	2.97E-03
SPLEEN	1.00E-09	3.73E-10	3.73E-10	2.62E-09	18.0	3.35E-03
UTERUS	9.93E-10	3.87E-10	1.14E-10	2.72E-09	12.5	2.29E-03
THYMUS	1.71E-10	3.87E-10	5.21E-10	2.72E-09	13.6	2.48E-03
THYROID	4.37E-10	1.89E-10	8.53E-10	1.33E-09	74.6	1.36E-02
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	3.59E-13	2.01E-12	4.26E-14	1.41E-11	7.20E+03	1.32E+00

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

TABLE L.1
(CONTINUED)

FOR NUCLIDE : TL-208, RESP CLEARANCE CLASS=W, PARTICLE SIZE=1.0 AMAD, F1=0.950E+0(

DOSE CONVERSION FACTORS

ORGAN	INGESTION LOW LET (A)	INGESTION HIGH LET (A)	INHALATION LOW LET (A)	INHALATION HIGH LET (A)	AIR IMMERSION (B)	GROUND SURFACE (C)
R MAR	1.72E-09	.0	1.28E-09	.0	1.90E+10	2.98E+06
ENDOST	1.03E-09	.0	1.03E-09	.0	2.13E+10	3.32E+06
PUL	2.57E-09	.0	5.01E-08	.0	1.91E+10	2.94E+06
MUSCLE	2.23E-09	.0	1.33E-09	.0	2.01E+10	3.10E+06
LIVER	3.22E-09	.0	2.30E-09	.0	1.82E+10	2.79E+06
S WALL	2.45E-07	.0	2.35E-09	.0	1.67E+10	2.60E+06
PANCREAS	2.25E-08	.0	2.32E-09	.0	2.33E+10	3.46E+06
LLI WALL	2.45E-09	.0	1.17E-10	.0	1.66E+10	2.52E+06
KIDNEYS	5.12E-09	.0	1.19E-09	.0	1.61E+10	2.50E+06
BL WALL	8.99E-10	.0	1.55E-10	.0	1.96E+10	2.98E+06
ULI WALL	6.36E-09	.0	5.22E-10	.0	2.20E+10	3.32E+06
SI WALL	1.20E-08	.0	4.18E-10	.0	1.67E+10	2.55E+06
OVARIES	2.10E-09	.0	2.57E-10	.0	1.85E+10	2.72E+06
TESTES	3.71E-10	.0	1.05E-10	.0	1.31E+10	2.13E+06
SPLEEN	1.26E-08	.0	2.18E-09	.0	1.60E+10	2.53E+06
UTERUS	2.24E-09	.0	2.98E-10	.0	1.55E+10	2.36E+06
THYMUS	8.80E-10	.0	3.81E-09	.0	2.26E+10	3.36E+06
THYROID	3.65E-10	.0	1.11E-09	.0	2.25E+10	3.39E+06
GENETICALLY SIGNIFICANT DOSE CONVERSION FACTORS FOR 30 YEAR EXPOSURE PERIOD						
	(D)	(D)	(D)	(D)	(E)	(F)
TESTES	1.11E-08	.0	3.16E-09	.0	3.93E+11	6.39E+07
OVARIES	6.29E-08	.0	7.70E-09	.0	5.55E+11	8.16E+07
AVERAGE	3.70E-08	.0	5.43E-09	.0	4.74E+11	7.28E+07

FATAL CANCER RISK CONVERSION FACTORS FOR LIFETIME EXPOSURE

CANCER	INGESTION LOW LET (G)	INGESTION HIGH LET (G)	INHALATION LOW LET (G)	INHALATION HIGH LET (G)	AIR IMMERSION (H)	GROUND SURFACE (I)
R MARROW	5.59E-10	.0	4.18E-10	.0	6.18E+03	.970
ENDOST	3.16E-11	.0	3.17E-11	.0	656.	.102
PULMNARY	1.56E-09	.0	3.05E-08	.0	1.16E+04	1.79
BREAST	8.89E-10	.0	5.30E-10	.0	8.02E+03	1.24
LIVER	5.02E-10	.0	3.59E-10	.0	2.84E+03	.436
ST WALL	2.13E-08	.0	2.04E-10	.0	1.45E+03	.226
PANCREAS	2.73E-09	.0	2.82E-10	.0	2.83E+03	.420
LLI WALL	1.70E-10	.0	8.15E-12	.0	1.15E+03	.175
KIDNEYS	1.78E-10	.0	4.12E-11	.0	559.	8.68E-02
BL WALL	3.12E-11	.0	5.39E-12	.0	680.	.103
ULI WALL	2.21E-10	.0	1.81E-11	.0	763.	.115
SI WALL	2.07E-10	.0	7.25E-12	.0	290.	4.42E-02
OVARIES	3.64E-11	.0	4.46E-12	.0	321.	4.72E-02
TESTES	6.44E-12	.0	1.82E-12	.0	227.	3.70E-02
SPLEEN	2.18E-10	.0	3.79E-11	.0	278.	4.39E-02
UTERUS	3.89E-11	.0	5.17E-12	.0	269.	4.09E-02
THYMUS	1.53E-11	.0	6.62E-11	.0	392.	5.83E-02
THYROID	3.09E-11	.0	9.40E-11	.0	1.90E+03	.287
GENETIC EFFECT RISK CONVERSION FACTORS						
	(J)	(J)	(J)	(J)	(K)	(L)
AVERAGE	1.11E-14	0.00E-01	1.64E-15	0.00E-01	1.42E+05	2.18E+01

TABLE OF UNITS

(A) - 70 YEAR COMMITTED DOSE (MILLIRAD)/(PERSON PICOCURIE)
(B) - (MILLIRAD/YR)/(PERSON MICROCURIE/CC)
(C) - (MILLIRAD/YR)/(PERSON MICROCURIE/CM**2)
(D) - (MILLIRAD)/(PERSON PICOCURIE/YR)
(E) - (MILLIRAD)/(PERSON MICROCURIE/CC)
(F) - (MILLIRAD)/(PERSON MICROCURIE/CM**2)
(G) - (DEATHS)/(1E+5 PERSONS PICOCURIE/YR)
(H) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CC)
(I) - (DEATHS)/(1E+5 PERSONS PICOCURIE/CM**2)
(J) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON PICOCURIE/YR)
(K) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CC)
(L) - (GENETIC EFFECTS/LIVE BIRTH)/(PERSON MICROCURIE/CM**2)

Table L.2

ADDITIONAL INPUT DATA USED BY DARTAB IN THE
HEALTH IMPACT ASSESSMENT OF AIRBORNE EMISSIONS

Ground surface correction factor for external dose = 0.50
Quality factor = 1.0 (low LET) and 20.0 (high LET)
Genetic effect risk coefficient for genetically significant dose (GSD) =
300 effects/10^6 live birth rad(GSD) (low LET) and
30000 effects/10^6 live birth rad (GSD) (high LET)
Regional population birth rate = 0.14133E-01 births/yr
Average lifetime expectancy = 70.7565 years
Rn-222 decay products risk conversion factor for a lifetime exposure =
1.69 cancer deaths/person-WL
Organ dose weighting factors used to determine weighted mean dose equivalent

target organ	weighting factor
red marrow	0.15590
endosteal cells	0.01470
pulmonary	0.29080
muscle	0.19080
liver	0.07460
stomach wall	0.04150
pancreas	0.05810
LLI wall	0.03320
kidneys	0.01660
bladder wall	0.01660
ULI wall	0.01660
SI wall	0.00830
ovaries	0.00830
testes	0.00830
spleen	0.00830
uterus	0.00830
thymus	0.00830
thyroid	0.04050

TABLE L.3. EXAMPLE INPUT DATA FILE FOR DARTAB

```
ACT. AV. SURFACE MINE(ORE SOURCE)-MAX. INDIV. DOSE AND RISK PARAMETERS
&INPUT
 ILOC=0, JLOC=0, PLOC=100., ILET=2*1,
 DTABLE=0, 0, 1, 1, 0, 0, 1,
 RTABLE=0, 0, 1, 1, 0, 0, 1,
 FTABLE=0, 0, 1, 1, 0, 0, 1,
 OUTPUT=F, GSCFAC=0.5,
&END
&ORGAN
 NORGN=18,
 ORGN='R MAR', 'ENDOST', '*PUL*', 'MUSCLE', 'LIVER', 'S WALL',
 'PANCREAS', 'LLI WALL', 'KIDNEYS', 'BL WALL', 'ULI WALL', 'SI WALL',
 'OVARIES', 'TESTES', 'SPLEEN','UTERUS', 'THYMUS', 'THYROID',
 TIME=20*70.,
&END
&QFACTR
 LLET=20*1., HLET=20*20.,
&CANCER
 NCANC=18,
 CANC='R MARROW', 'ENDOST', 'PULMNARY', 'BREAST', 'LIVER', 'ST WALL',
 'PANCREAS', 'LLI WALL', 'KIDNEYS', 'BL WALL', 'ULI WALL', 'SI WALL',
 'OVARIES', 'TESTES', 'SPLEEN', 'UTERUS', 'THYMUS', 'THYROID',
 RELABS=20*1.,
&END
&GENTIC
 GENEFF=T, NGEN=3, GEN='TESTES', 'OVARIES', 'AVERAGE',
 GRFAC=200., 20000., REPPER=.014133,
 GLLET=3*1., GHLET=3*20.,
&END
&LOCTBL
 NTLOC=1,
 RNLOC='SUM',
 OGLOC='SUM',
 PTLOC=7,
 FALOC=2,
 HLLOC=1,
 LTABLE=1,
&END
&ORGANF
 NORGB=18,
 ORGB='R MAR', 'ENDOST', '*PUL*', 'MUSCLE', 'LIVER', 'S WALL',
 'PANCREAS', 'LLI WALL', 'KIDNEYS', 'BL WALL', 'ULI WALL', 'SI WALL',
 'OVARIES', 'TESTES', 'SPLEEN','UTERUS', 'THYMUS', 'THYROID',
 IPATH=18*5,
 ORGDAT=.1559, .0147, .2908, .1908, .0746, .0415, .0581, .0332, .0166,
 .0166, .0166, .0083, .0083, .0083, .0083, .0083, .0083, .0405,
&END
```

Table L.4 Maximum individual fatal cancer risk for one year of exposure to atmospheric radioactive emissions from model uranium mines

Source	Lifetime fatal cancer risk					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine						
Particulates & Rn-222	1.6E-7	3.6E-7	1.7E-8	8.4E-8	4.8E-8	6.7E-7
Rn-222 daughters	3.3E-6	7.0E-7	8.3E-7	6.6E-7	0	5.5E-6
Total	3.5E-6	1.1E-6	8.5E-7	7.5E-7	4.8E-8	6.2E-6
Average Large Surface Mine						
Particulates & Rn-222	9.6E-7	1.9E-6	5.9E-8	4.7E-7	2.9E-7	3.7E-6
Rn-222 daughters	1.3E-5	1.3E-6	2.8E-6	2.9E-6	0	1.9E-5
Total	1.4E-5	3.2E-6	2.8E-6	3.4E-6	2.9E-7	2.3E-5
Average Underground Mine						
Particulates & Rn-222	3.1E-8	5.8E-8	6.5E-8	6.3E-10	4.0E-9	1.6E-7
Rn-222 daughters	9.0E-6	2.2E-7	1.8E-6	1.4E-8	0	1.1E-5
Total	9.0E-6	2.8E-7	1.9E-6	1.5E-8	4.0E-9	1.1E-5
Average Large Underground Mine						
Particulates & Rn-222	3.4E-7	6.4E-7	3.7E-7	3.3E-9	8.0E-9	1.4E-6
Rn-222 daughters	1.0E-4	2.0E-6	9.8E-6	7.6E-8	0	1.1E-4
Total	1.0E-4	2.6E-6	1.0E-5	7.9E-8	8.0E-9	1.1E-4
Inactive Surface Mine						
Particulates & Rn-222	0	N.A.[a]	N.A.	5.5E-8[b]	N.A.	5.5E-8
Rn-222 daughters	1.3E-7	N.A.	N.A.	2.9E-7[b]	N.A.	4.2E-7
Total	1.3E-7	N.A.	N.A.	3.4E-7[b]	N.A.	4.7E-7
Inactive Underground Mine						
Particulates & Rn-222	0	N.A.	N.A.	1.5E-8[b]	N.A.	1.5E-8
Rn-222 daughters	2.2E-7	N.A.	N.A.	5.0E-8[b]	N.A.	2.7E-7
Total	2.2E-7	N.A.	N.A.	6.5E-8[b]	N.A.	2.8E-7
In situ Leach Mine						
Particulates & Rn-222	1.6E-6	N.A.	N.A.	N.A.	N.A.	1.6E-6
Rn-222 daughters	1.1E-5	N.A.	N.A.	N.A.	N.A.	1.1E-5
Total	1.3E-5	N.A.	N.A.	N.A.	N.A.	1.3E-5

[a] N.A. - Not applicable.
[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

Table L.5 Fatal cancer risk to an average individual in the regional population for one year of exposure to atmospheric radioactive emissions from model uranium mines

Source	Lifetime fatal cancer risk					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine						
Particulates & Rn-222	1.9E-10	4.0E-10	2.0E-11	9.1E-11	4.7E-11	7.5E-10
Rn-222 daughters	6.5E-9	1.4E-9	1.6E-9	1.3E-9	0	1.1E-8
Total	6.7E-9	1.8E-9	1.6E-9	1.4E-9	4.7E-11	1.2E-8
Average Large Surface Mine						
Particulates & Rn-222	1.1E-9	1.7E-9	7.0E-11	5.5E-10	2.8E-10	3.7E-9
Rn-222 daughters	2.6E-8	3.1E-9	5.4E-9	6.6E-9	0	4.1E-8
Total	2.7E-8	4.8E-9	5.5E-9	7.1E-9	2.8E-10	4.5E-8
Average Underground Mine						
Particulates & Rn-222	9.7E-11	7.8E-11	9.8E-11	9.2E-13	6.5E-12	2.8E-10
Rn-222 daughters	4.0E-8	1.0E-9	8.0E-9	6.6E-11	0	4.9E-8
Total	4.0E-8	1.1E-9	8.1E-9	6.7E-11	6.5E-12	4.9E-8
Average Large Underground Mine						
Particulates & Rn-222	1.1E-9	8.6E-10	5.6E-10	4.9E-12	1.3E-11	2.5E-9
Rn-222 daughters	4.5E-7	9.0E-9	4.4E-8	3.4E-10	0	5.0E-7
Total	4.5E-7	9.9E-9	4.5E-8	3.4E-10	1.3E-11	5.0E-7
Inactive Surface Mine						
Particulates & Rn-222	0	N.A.[a]	N.A.	6.4E-11[b]	N.A.	6.4E-11
Rn-222 daughters	2.6E-10	N.A.	N.A.	5.7E-10[b]	N.A.	8.3E-10
Total	2.6E-10	N.A.	N.A.	6.3E-10[b]	N.A.	8.9E-10
Inactive Underground Mine						
Particulates & Rn-222	0	N.A.	N.A.	2.0E-11[b]	N.A.	2.0E-11
Rn-222 daughters	9.9E-10	N.A.	N.A.	2.2E-10[b]	N.A.	1.2E-9
Total	9.9E-10	N.A.	N.A.	2.4E-10[b]	N.A.	1.2E-9
In situ Leach Mine						
Particulates & Rn-222	8.7E-10	N.A.	N.A.	N.A.	N.A.	8.7E-10
Rn-222 daughters	2.1E-8	N.A.	N.A.	N.A.	N.A.	2.1E-8
Total	2.2E-8	N.A.	N.A.	N.A.	N.A.	2.2E-8

[a] N.A. - not applicable.

[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

Table L.6 Fatal cancer risk to the population for one year of exposure to atmospheric radioactive emissions from model uranium mines

Source	Estimated fatal cancers					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine						
Particulates & Rn-222	2.6E-6	5.7E-6	2.8E-7	1.3E-6	6.8E-7	1.1E-5
Rn-222 daughters	9.3E-5	2.0E-5	2.3E-5	1.9E-5	0	1.6E-4
Total	9.5E-5	2.6E-5	2.4E-5	2.0E-5	6.8E-7	1.7E-4
Average Large Surface Mine						
Particulates & Rn-222	1.6E-5	2.5E-5	1.0E-6	7.9E-6	4.0E-6	5.4E-5
Rn-222 daughters	3.7E-4	4.5E-5	7.7E-5	9.4E-5	0	5.9E-4
Total	3.9E-4	7.0E-5	7.8E-5	1.0E-4	4.0E-6	6.4E-4
Average Underground Mine						
Particulates & Rn-222	3.5E-6	2.8E-6	3.5E-6	3.3E-8	2.3E-7	1.0E-5
Rn-222 daughters	1.4E-3	3.6E-5	2.9E-4	2.4E-6	0	1.7E-3
Total	1.4E-3	3.9E-5	2.9E-4	2.4E-6	2.3E-7	1.7E-3
Average Large Underground Mine						
Particulates & Rn-222	3.8E-5	3.1E-5	2.0E-5	1.8E-7	4.6E-7	9.0E-5
Rn-222 daughters	1.6E-2	3.2E-4	1.6E-3	1.2E-5	0	1.8E-2
Total	1.6E-2	3.5E-4	1.6E-3	1.2E-5	4.6E-7	1.8E-2
Inactive Surface Mine						
Particulates & Rn-222	0	N.A.[a]	N.A.	9.1E-7[b]	N.A.	9.1E-7
Rn-222 daughters	3.8E-6	N.A.	N.A.	8.1E-6[b]	N.A.	1.2E-5
Total	3.8E-6	N.A.	N.A.	9.0E-6[b]	N.A.	1.3E-5
Inactive Underground Mine						
Particulates & Rn-222	0	N.A.	N.A.	7.4E-7[b]	N.A.	7.4E-7
Rn-222 daughters	3.6E-5	N.A.	N.A.	8.0E-6[b]	N.A.	4.4E-5
Total	3.6E-5	N.A.	N.A.	8.7E-6[b]	N.A.	4.5E-5
In situ Leach Mine						
Particulates & Rn-222	1.2E-5	N.A.	N.A.	N.A.	N.A.	1.2E-5
Rn-222 daughters	3.0E-4	N.A.	N.A.	N.A.	N.A.	3.0E-4
Total	3.1E-4	N.A.	N.A.	N.A.	N.A.	3.1E-4

[a] N.A. - Not applicable.

[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

Table L.7 Genetic effect risk to descendants of maximum exposed individual for one year of parental exposure to atmospheric radioactive particulate and Rn-222 emissions from model uranium mines

Source	Genetic risk (effects/birth)					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine	1.5E-7	3.4E-7	1.5E-8	8.0E-8	4.4E-8	6.3E-7
Average Large Surface Mine	9.2E-7	2.0E-6	5.2E-8	4.5E-7	2.6E-7	3.7E-6
Average Underground Mine	1.3E-8	5.7E-8	6.2E-8	5.8E-10	3.6E-9	1.4E-7
Average Large Underground Mine	1.4E-7	6.3E-7	3.4E-7	3.2E-9	7.2E-9	1.1E-6
Inactive Surface Mine	3.9E-13	N.A.[a]	N.A.	6.0E-8[b]	N.A.	6.0E-8
Inactive Underground Mine	6.3E-13	N.A.	N.A.	1.6E-8[b]	N.A.	1.6E-8
In situ Leach Mine	8.0E-9	N.A.	N.A.	N.A.	N.A.	8.0E-9

[a] N.A. - Not applicable.

[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

Table L.8 Genetic effect risk to descendants of average individual of the population for one year of parental exposure to atmospheric radioactive particulate and Rn-222 emissions from model uranium mines

Source	Genetic risk (effects/birth)					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine	6.2E-10	1.4E-9	6.0E-11	3.3E-10	1.6E-10	2.6E-9
Average Large Surface Mine	3.8E-9	6.3E-9	2.1E-10	2.0E-9	9.6E-10	1.3E-8
Average Underground Mine	2.7E-11	1.2E-10	1.3E-10	1.2E-12	9.3E-12	2.9E-10
Average Large Underground Mine	3.0E-10	1.3E-9	7.4E-10	6.4E-12	1.8E-11	2.4E-9
Inactive Surface Mine	7.5E-16	N.A.[a]	N.A.	2.4E-10[b]	N.A.	2.4E-10
Inactive Underground Mine	2.8E-15	N.A.	N.A.	3.4E-11[b]	N.A.	3.4E-11
In situ Leach Mine	2.7E-11	N.A.	N.A.	N.A.	N.A.	2.7E-11

[a] N.A. - Not applicable.

[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

Table L.9 Genetic effect risk to descendants of the regional population for one year of parental exposure to atmospheric radioactive particulates and Rn-222 emissions from model uranium mines

Source	Genetic risk (effects/yr)					
	Mining Activities	Ore	Sub-ore	Overburden	Vehicular Dust	Total
Average Surface Mine	3.8E-6	8.6E-6	3.6E-7	2.0E-6	9.9E-7	1.6E-5
Average Large Surface Mine	2.2E-5	3.8E-5	1.3E-6	1.2E-5	5.8E-6	7.9E-5
Average Underground Mine	4.2E-7	1.8E-6	2.0E-6	1.8E-8	1.4E-7	4.4E-6
Average Large Underground Mine	4.5E-6	2.0E-5	1.1E-5	9.9E-8	2.8E-7	3.6E-5
Inactive Surface Mine	4.5E-12	N.A.[a]	N.A.	1.4E-6[b]	N.A.	1.4E-6
Inactive Underground Mine	4.3E-11	N.A.	N.A.	5.0E-7[b]	N.A.	5.0E-7
In situ Leach Mine	1.6E-7	N.A.	N.A.	N.A.	N.A.	1.6E-7

[a] N.A. - Not applicable.

[b] Consists of waste rock covered over by sub-ore (see Sections 3.7.1.1 and 3.7.2.1).

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