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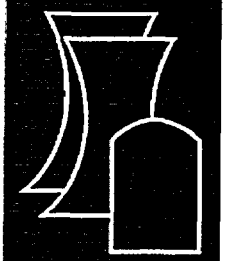

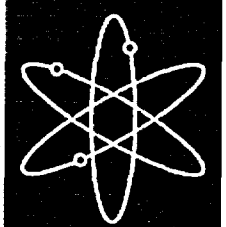

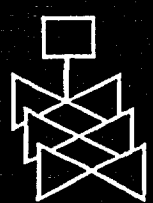

Radiological Assessments for Clearance of Materials from Nuclear Facilities

Appendices F and G

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Radiological Assessments for Clearance of Materials from Nuclear Facilities

Appendices F and G

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ABSTRACT

This report provides a complete description of calculations and their results estimating potential annual doses, normalized to a unit concentration, to an individual following the clearance of specific materials. These materials are scrap iron and steel, copper, aluminum, and concrete rubble from licensed nuclear facilities. Clearance means the removal of radiological controls by the licensing authority. The estimated potential doses are calculated probabilistically to account for a large number of possible variations in each of the 86 scenarios. These scenarios encompass the full range of realistic situations likely to yield the greatest normalized doses. Each scenario was analyzed with the 115 radionuclides considered most likely to be associated with materials from licensed nuclear facilities. The design basis of the analyses is to realistically model current processes, to identify critical groups on a nuclide-by-nuclide basis, and to enable the conversion of a dose criterion to a concentration.

Material for recycle or disposal was evaluated using material flow models and dose assessment models. Both models are based on probabilistic methods. This resulted in distributions of nuclide-by-nuclide normalized doses from one year of exposure per mass- or surface-based concentrations. The means and the 5th, 50th, 90th, and 95th percentiles are reported. These percentiles can be used to generically evaluate the likelihood that the derived mean concentration would correspond to a particular dose criterion. Additionally, they can be used to quantify the confidence that a safety goal is not exceeded.

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F RESULTS OF ASSESSMENTS OF IRON AND STEEL SCRAP

This appendix presents some of the results of the radiological assessments of the recycling and disposal of iron and steel scrap cleared from NRC-licensed facilities. Monte Carlo uncertainty analyses are employed to calculate 5,800 to 10,000 realizations for each radionuclide in each of 37 exposure scenarios. The end points of the analyses are the effective dose equivalent (EDE) and the effective dose from one year of exposure, normalized to an initial unit activity concentration of each separate radionuclide in the scrap metal at the time of clearance. The results are reported as both mass-based and surficial normalized doses (μSv per Bq/g and μSv per Bq/cm^2).

The mean normalized doses from each radionuclide in 30 of these scenarios are ranked to determine the critical groups for each nuclide. The mean and the 5th, 50th, 90th, and 95th percentile values of the normalized EDEs from 5,800 to 10,000 realizations of these 30 scenarios are tabulated in Appendix F-1. The corresponding effective doses are listed in Appendix F-2. The results from the seven scenarios describing exposures to iron and steel products produced from the single furnace heat during one year that contains the maximum fraction of cleared scrap that were not included in the ranking are presented in Appendix M.

Some scenarios involve only one exposure pathway: either external exposure or ingestion of water. In others, doses are delivered by all three principal pathways: external exposure, inhalation, and ingestion. The results of scenarios with multiple pathways are presented in sets of four tables: one table lists the sum of the doses via all three pathways, while the other three list the doses from each individual pathway. When only one pathway is active, a single table of results is presented. The pathways addressed in the analysis of each scenario are presented in Table 3.10 in Volume 1 of this report.

In the interest of a uniform presentation, all 115 radionuclides addressed by the analysis are listed in the dose tables. However, not every nuclide is present in every scenario. When the source of exposure is material produced during the melting and refining of scrap metal, the only nuclides that result in doses to the exposed individuals are those that partition to the given medium: metal product, slag, dust, or gaseous effluent. The doses from all other nuclides are listed as zero.

The doses from certain other nuclides in some scenarios are also listed as zero. In scenarios where external exposure is the only pathway, the dose contributions from three radionuclides H-3, Ca-41 and Mn-53 are not assessed. H-3 is an extremely weak β-emitter which produces a negligibly small external exposure. Ca-41 and Mn-43 decay by electron capture and emit low-energy x-rays (E_γ < 10 keV) that are below the threshold for external exposure calculations in the present analysis. The dose contributions from external exposure to other nuclides emitting low-energy x- and γ-rays would be negligible in scenarios where shielding between the source and the receptor would essentially absorb such radiation. In the groundwater scenarios, some nuclides would not reach the well during the maximum period of assessment, which is 1,000 years or 20 half-lives of the nuclide in question, whichever is shorter.

Table F1.1 Normalized effective dose equivalents from all pathways: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	3.4e-05	2.2e-06	1.6e-05	9.2e-05	1.3e-04	6.7e-06	4.3e-07	3.2e-06	1.8e-05	2.7e-05
C-14	1.1e-03	7.8e-05	5.5e-04	3.1e-03	4.5e-03	2.3e-04	1.5e-05	1.1e-04	6.0e-04	9.0e-04
Na-22	4.2e+01	4.2e+00	2.1e+01	1.1e+02	1.6e+02	8.3e+00	8.4e-01	4.2e+00	2.1e+01	3.0e+01
P-32	5.7e-02	5.5e-03	2.9e-02	1.5e-01	2.1e-01	1.1e-02	1.1e-03	5.6e-03	2.9e-02	4.1e-02
S-35	3.7e-04	3.9e-05	1.9e-04	9.8e-04	1.4e-03	7.4e-05	7.7e-06	3.8e-05	1.9e-04	2.7e-04
Cl-36	1.5e-02	1.6e-03	7.5e-03	3.8e-02	5.3e-02	2.9e-03	3.2e-04	1.5e-03	7.4e-03	1.1e-02
K-40	3.4e+00	3.4e-01	1.7e+00	8.7e+00	1.3e+01	6.7e-01	6.8e-02	3.4e-01	1.7e+00	2.4e+00
Ca-41	6.8e-04	4.5e-05	3.3e-04	1.8e-03	2.7e-03	1.4e-04	8.8e-06	6.4e-05	3.6e-04	5.4e-04
Ca-45	2.0e-03	1.8e-04	1.0e-03	5.4e-03	7.7e-03	4.0e-04	3.6e-05	2.0e-04	1.1e-03	1.5e-03
Sc-46	3.8e+01	3.7e+00	1.9e+01	9.7e+01	1.4e+02	7.4e+00	7.4e-01	3.8e+00	1.9e+01	2.7e+01
Cr-51	3.5e-01	3.4e-02	1.8e-01	9.0e-01	1.3e+00	6.9e-02	6.8e-03	3.5e-02	1.8e-01	2.5e-01
Mn-53	8.3e-05	8.1e-06	4.2e-05	2.2e-04	3.1e-04	1.7e-05	1.6e-06	8.4e-06	4.3e-05	6.1e-05
Mn-54	1.6e+01	1.6e+00	8.1e+00	4.1e+01	5.9e+01	3.2e+00	3.2e-01	1.6e+00	8.1e+00	1.2e+01
Fe-55	4.6e-04	4.4e-05	2.3e-04	1.2e-03	1.7e-03	9.1e-05	8.8e-06	4.6e-05	2.4e-04	3.4e-04
Fe-59	2.1e+01	2.1e+00	1.1e+01	5.4e+01	7.8e+01	4.2e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01
Co-56	6.8e+01	6.7e+00	3.4e+01	1.7e+02	2.5e+02	1.3e+01	1.3e+00	6.8e+00	3.5e+01	4.9e+01
Co-57	5.5e-01	5.5e-02	2.8e-01	1.4e+00	2.0e+00	1.1e-01	1.1e-02	5.5e-02	2.8e-01	4.0e-01
Co-58	1.7e+01	1.7e+00	8.6e+00	4.4e+01	6.3e+01	3.3e+00	3.3e-01	1.7e+00	8.7e+00	1.2e+01
Co-60	5.2e+01	5.2e+00	2.7e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.7e+01	3.8e+01
Ni-59	4.6e-04	5.2e-05	2.4e-04	1.2e-03	1.6e-03	9.1e-05	1.0e-05	4.7e-05	2.3e-04	3.3e-04
Ni-63	4.7e-04	4.7e-05	2.4e-04	1.2e-03	1.7e-03	9.4e-05	9.5e-06	4.8e-05	2.5e-04	3.5e-04
Zn-65	1.2e+01	1.1e+00	5.8e+00	2.9e+01	4.3e+01	2.3e+00	2.3e-01	1.2e+00	5.9e+00	8.3e+00
As-73	3.9e-03	4.1e-04	2.0e-03	1.0e-02	1.4e-02	7.7e-04	8.1e-05	3.9e-04	2.0e-03	2.8e-03
Se-75	3.9e+00	3.9e-01	2.0e+00	1.0e+01	1.5e+01	7.8e-01	7.8e-02	3.9e-01	2.0e+00	2.8e+00
Sr-85	7.6e+00	7.5e-01	3.9e+00	2.0e+01	2.8e+01	1.5e+00	1.5e-01	7.6e-01	3.9e+00	5.5e+00
Sr-89	6.3e-02	6.4e-03	3.2e-02	1.6e-01	2.3e-01	1.2e-02	1.3e-03	6.3e-03	3.2e-02	4.5e-02
Sr-90	2.7e-01	3.0e-02	1.4e-01	7.1e-01	9.9e-01	5.4e-02	6.0e-03	2.8e-02	1.4e-01	2.0e-01
Y-91	1.4e-01	1.4e-02	6.9e-02	3.5e-01	5.0e-01	2.7e-02	2.7e-03	1.4e-02	7.0e-02	9.8e-02
Zr-93	8.3e-03	7.3e-04	3.3e-03	1.7e-02	2.3e-02	1.2e-03	1.4e-04	8.5e-04	3.3e-03	4.4e-03
Zr-95	1.5e+01	1.5e+00	7.6e+00	3.8e+01	5.5e+01	3.0e+00	3.0e-01	1.5e+00	7.6e+00	1.1e+01
Nb-93m	2.2e-03	2.6e-04	1.2e-03	5.8e-03	8.0e-03	4.4e-04	5.1e-05	2.3e-04	1.1e-03	1.6e-03
Nb-94	3.0e+01	3.0e+00	1.5e+01	7.7e+01	1.1e+02	6.0e+00	6.0e-01	3.0e+00	1.5e+01	2.2e+01
Nb-95	1.2e+01	1.2e+00	6.1e+00	3.1e+01	4.5e+01	2.4e+00	2.4e-01	1.2e+00	6.2e+00	8.8e+00
Mo-93	2.7e-03	3.1e-04	1.4e-03	7.1e-03	9.6e-03	5.3e-04	6.2e-05	2.8e-04	1.4e-03	1.9e-03
Tc-97	3.8e-04	4.3e-05	2.0e-04	9.9e-04	1.4e-03	7.5e-05	8.5e-06	3.9e-05	1.9e-04	2.7e-04
Tc-97m	1.9e-03	2.1e-04	9.6e-04	4.9e-03	6.7e-03	3.7e-04	4.2e-05	1.9e-04	9.6e-04	1.3e-03
Tc-99	1.6e-03	1.8e-04	8.5e-04	4.3e-03	6.0e-03	3.3e-04	3.6e-05	1.7e-04	8.5e-04	1.2e-03
Ru-103	7.1e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.1e-01	3.6e+00	5.2e+00
Ru-106	4.2e+00	4.2e-01	2.1e+00	1.1e+01	1.5e+01	8.2e-01	8.3e-02	4.2e-01	2.1e+00	3.0e+00
Ag-108m	2.9e+01	2.9e+00	1.5e+01	7.4e+01	1.1e+02	5.7e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Ag-110m	5.2e+01	5.2e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.7e+01	3.8e+01
Cd-109	2.2e-02	2.5e-03	1.1e-02	5.7e-02	7.8e-02	4.3e-03	5.1e-04	2.2e-03	1.1e-02	1.5e-02
Sn-113	3.7e+00	3.7e-01	1.9e+00	9.6e+00	1.4e+01	7.4e-01	7.5e-02	3.7e-01	1.9e+00	2.7e+00
Sb-124	3.4e+01	3.3e+00	1.7e+01	8.6e+01	1.2e+02	6.6e+00	6.6e-01	3.3e+00	1.7e+01	2.4e+01
Sb-125	7.1e+00	7.1e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.1e-01	3.6e+00	5.1e+00
Te-123m	8.8e-01	8.7e-02	4.4e-01	2.2e+00	3.2e+00	1.7e-01	1.7e-02	8.8e-02	4.5e-01	6.4e-01
Te-127m	8.2e-02	8.4e-03	4.2e-02	2.1e-01	3.0e-01	1.6e-02	1.7e-03	8.3e-03	4.2e-02	5.9e-02
I-125	2.2e-02	1.8e-03	1.1e-02	5.8e-02	8.4e-02	4.3e-03	3.6e-04	2.1e-03	1.1e-02	1.7e-02
I-129	1.4e-01	8.8e-03	6.8e-02	3.9e-01	5.7e-01	2.9e-02	1.7e-03	1.3e-02	7.7e-02	1.1e-01
I-131	2.7e+00	2.2e-01	1.3e+00	6.9e+00	1.0e+01	5.3e-01	4.4e-02	2.5e-01	1.4e+00	2.0e+00
Cs-134	2.9e+01	2.9e+00	1.5e+01	7.5e+01	1.1e+02	5.8e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Cs-135	3.9e-03	2.7e-04	1.9e-03	1.0e-02	1.5e-02	7.8e-04	5.4e-05	3.7e-04	2.1e-03	3.1e-03
Cs-137	1.0e+01	1.0e+00	5.3e+00	2.7e+01	3.9e+01	2.1e+00	2.1e-01	1.0e+00	5.3e+00	7.5e+00
Ba-133	4.9e+00	4.9e-01	2.5e+00	1.2e+01	1.8e+01	9.7e-01	9.7e-02	4.9e-01	2.5e+00	3.5e+00
Ce-139	9.2e-01	9.1e-02	4.7e-01	2.4e+00	3.4e+00	1.8e-01	1.8e-02	9.2e-02	4.7e-01	6.7e-01
Ce-141	3.5e-01	3.4e-02	1.8e-01	8.9e-01	1.3e+00	6.9e-02	6.8e-03	3.5e-02	1.8e-01	2.5e-01
Ce-144	1.0e+00	1.0e-01	5.1e-01	2.6e+00	3.7e+00	2.0e-01	2.0e-02	1.0e-01	5.1e-01	7.3e-01
Pm-147	3.2e-03	3.7e-04	1.7e-03	8.4e-03	1.1e-02	6.3e-04	7.3e-05	3.3e-04	1.7e-03	2.3e-03

Table F1.1 Normalized effective dose equivalents from all pathways: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.2e-03	2.5e-04	1.1e-03	5.7e-03	7.8e-03	4.3e-04	5.0e-05	2.2e-04	1.1e-03	1.5e-03
Eu-152	2.2e+01	2.2e+00	1.1e+01	5.5e+01	8.1e+01	4.3e+00	4.4e-01	2.2e+00	1.1e+01	1.6e+01
Eu-154	2.2e+01	2.1e+00	1.1e+01	5.5e+01	8.0e+01	4.3e+00	4.3e-01	2.2e+00	1.1e+01	1.6e+01
Eu-155	1.4e-01	1.4e-02	7.1e-02	3.6e-01	5.1e-01	2.8e-02	2.8e-03	1.4e-02	7.1e-02	1.0e-01
Gd-153	1.7e-01	1.7e-02	8.7e-02	4.4e-01	6.4e-01	3.4e-02	3.4e-03	1.7e-02	8.8e-02	1.2e-01
Tb-160	2.0e+01	1.9e+00	1.0e+01	5.1e+01	7.3e+01	3.9e+00	3.9e-01	2.0e+00	1.0e+01	1.4e+01
Tm-170	2.1e-02	2.3e-03	1.1e-02	5.5e-02	7.7e-02	4.2e-03	4.5e-04	2.2e-03	1.1e-02	1.5e-02
Tm-171	1.2e-03	1.5e-04	6.4e-04	3.3e-03	4.4e-03	2.4e-04	2.9e-05	1.3e-04	6.3e-04	8.7e-04
Ta-182	2.3e+01	2.3e+00	1.2e+01	6.0e+01	8.6e+01	4.6e+00	4.6e-01	2.3e+00	1.2e+01	1.7e+01
W-181	3.1e-02	3.1e-03	1.6e-02	7.8e-02	1.1e-01	6.1e-03	6.1e-04	3.1e-03	1.6e-02	2.2e-02
W-185	2.0e-03	2.2e-04	1.0e-03	5.3e-03	7.3e-03	4.0e-04	4.3e-05	2.0e-04	1.0e-03	1.4e-03
Os-185	1.1e+01	1.1e+00	5.7e+00	2.9e+01	4.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Ir-192	1.1e+01	1.1e+00	5.7e+00	2.9e+01	4.2e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Tl-204	1.2e-02	1.2e-03	6.0e-03	3.0e-02	4.2e-02	2.3e-03	2.4e-04	1.2e-03	5.9e-03	8.4e-03
Pb-210	4.9e+00	4.3e-01	2.5e+00	1.3e+01	1.9e+01	9.7e-01	8.6e-02	4.9e-01	2.5e+00	3.7e+00
Bi-207	2.9e+01	2.9e+00	1.5e+01	7.4e+01	1.1e+02	5.7e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Po-210	1.4e+00	1.3e-01	7.0e-01	3.5e+00	5.1e+00	2.7e-01	2.7e-02	1.4e-01	7.2e-01	1.0e+00
Ra-226	3.5e+01	3.6e+00	1.8e+01	9.0e+01	1.3e+02	7.0e+00	7.2e-01	3.5e+00	1.8e+01	2.5e+01
Ra-228	1.8e+01	1.8e+00	9.1e+00	4.6e+01	6.6e+01	3.6e+00	3.7e-01	1.8e+00	9.1e+00	1.3e+01
Ac-227	9.9e+01	1.2e+01	5.2e+01	2.6e+02	3.5e+02	2.0e+01	2.3e+00	1.0e+01	5.1e+01	7.0e+01
Th-228	4.6e+01	5.2e+00	2.4e+01	1.2e+02	1.6e+02	9.0e+00	1.0e+00	4.7e+00	2.3e+01	3.2e+01
Th-229	1.5e+02	1.7e+01	7.8e+01	3.9e+02	5.3e+02	2.9e+01	3.4e+00	1.5e+01	7.7e+01	1.1e+02
Th-230	2.2e+01	2.5e+00	1.1e+01	5.7e+01	7.8e+01	4.3e+00	5.0e-01	2.2e+00	1.1e+01	1.6e+01
Th-232	1.1e+02	1.3e+01	5.8e+01	2.9e+02	3.9e+02	2.2e+01	2.5e+00	1.1e+01	5.7e+01	7.9e+01
Pa-231	9.0e+01	1.1e+01	4.7e+01	2.4e+02	3.2e+02	1.8e+01	2.1e+00	9.3e+00	4.7e+01	6.4e+01
U-232	4.5e+01	5.2e+00	2.3e+01	1.2e+02	1.6e+02	8.8e+00	1.0e+00	4.6e+00	2.3e+01	3.2e+01
U-233	9.1e+00	1.1e+00	4.8e+00	2.4e+01	3.3e+01	1.8e+00	2.1e-01	9.4e-01	4.7e+00	6.5e+00
U-234	8.9e+00	1.0e+00	4.7e+00	2.3e+01	3.2e+01	1.8e+00	2.0e-01	9.2e-01	4.6e+00	6.4e+00
U-235	9.6e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.9e-01	4.9e+00	6.8e+00
U-236	8.4e+00	9.7e-01	4.4e+00	2.2e+01	3.0e+01	1.7e+00	1.9e-01	8.7e-01	4.3e+00	6.0e+00
U-238	8.5e+00	9.9e-01	4.4e+00	2.2e+01	3.0e+01	1.7e+00	2.0e-01	8.8e-01	4.4e+00	6.0e+00
Np-237	4.0e+01	4.7e+00	2.1e+01	1.1e+02	1.4e+02	8.0e+00	9.4e-01	4.2e+00	2.1e+01	2.9e+01
Pu-236	1.0e+01	1.2e+00	5.3e+00	2.6e+01	3.6e+01	2.0e+00	2.3e-01	1.0e+00	5.2e+00	7.2e+00
Pu-238	2.7e+01	3.2e+00	1.4e+01	7.2e+01	9.8e+01	5.4e+00	6.3e-01	2.8e+00	1.4e+01	2.0e+01
Pu-239	3.0e+01	3.5e+00	1.6e+01	7.9e+01	1.1e+02	5.9e+00	6.9e-01	3.1e+00	1.6e+01	2.1e+01
Pu-240	3.0e+01	3.5e+00	1.6e+01	7.9e+01	1.1e+02	5.9e+00	6.9e-01	3.1e+00	1.6e+01	2.1e+01
Pu-241	5.8e-01	6.7e-02	3.0e-01	1.5e+00	2.1e+00	1.1e-01	1.3e-02	6.0e-02	3.0e-01	4.1e-01
Pu-242	2.9e+01	3.3e+00	1.5e+01	7.5e+01	1.0e+02	5.7e+00	6.6e-01	3.0e+00	1.5e+01	2.0e+01
Pu-244	3.4e+01	4.1e+00	1.8e+01	9.0e+01	1.2e+02	6.8e+00	8.0e-01	3.5e+00	1.8e+01	2.4e+01
Am-241	3.1e+01	3.6e+00	1.6e+01	8.2e+01	1.1e+02	6.2e+00	7.2e-01	3.2e+00	1.6e+01	2.2e+01
Am-242m	3.1e+01	3.6e+00	1.6e+01	8.1e+01	1.1e+02	6.1e+00	7.1e-01	3.2e+00	1.6e+01	2.2e+01
Am-243	3.2e+01	3.8e+00	1.7e+01	8.5e+01	1.1e+02	6.4e+00	7.5e-01	3.3e+00	1.7e+01	2.3e+01
Cm-242	1.2e+00	1.3e-01	6.0e-01	3.0e+00	4.1e+00	2.3e-01	2.6e-02	1.2e-01	5.9e-01	8.2e-01
Cm-243	2.2e+01	2.6e+00	1.2e+01	5.9e+01	8.0e+01	4.5e+00	5.2e-01	2.3e+00	1.2e+01	1.6e+01
Cm-244	1.7e+01	2.0e+00	9.0e+00	4.5e+01	6.2e+01	3.4e+00	4.0e-01	1.8e+00	9.0e+00	1.2e+01
Cm-245	3.2e+01	3.8e+00	1.7e+01	8.5e+01	1.2e+02	6.4e+00	7.5e-01	3.3e+00	1.7e+01	2.3e+01
Cm-246	3.2e+01	3.7e+00	1.8e+01	8.3e+01	1.1e+02	6.2e+00	7.3e-01	3.3e+00	1.6e+01	2.2e+01
Cm-247	3.4e+01	4.0e+00	1.8e+01	9.0e+01	1.2e+02	6.7e+00	7.9e-01	3.5e+00	1.7e+01	2.4e+01
Cm-248	1.2e+02	1.3e+01	6.0e+01	3.0e+02	4.1e+02	2.3e+01	2.7e+00	1.2e+01	6.0e+01	8.2e+01
Bk-249	9.7e-02	1.1e-02	5.1e-02	2.5e-01	3.5e-01	1.9e-02	2.2e-03	1.0e-02	5.0e-02	6.9e-02
Cf-248	3.5e+00	4.0e-01	1.8e+00	9.1e+00	1.2e+01	6.8e-01	7.9e-02	3.6e-01	1.8e+00	2.5e+00
Cf-249	3.2e+01	3.8e+00	1.7e+01	8.5e+01	1.1e+02	6.4e+00	7.6e-01	3.3e+00	1.7e+01	2.3e+01
Cf-250	1.5e+01	1.7e+00	7.6e+00	3.8e+01	5.2e+01	2.9e+00	3.4e-01	1.5e+00	7.6e+00	1.0e+01
Cf-251	2.9e+01	3.4e+00	1.5e+01	7.6e+01	1.0e+02	5.7e+00	6.6e-01	3.0e+00	1.5e+01	2.0e+01
Cf-252	1.1e+01	1.3e+00	5.6e+00	2.8e+01	3.9e+01	2.1e+00	2.5e-01	1.1e+00	5.6e+00	7.7e+00
Cf-254	3.3e+02	3.3e+01	1.7e+02	8.5e+02	1.2e+03	6.5e+01	6.7e+00	3.3e+01	1.7e+02	2.4e+02
Es-254	2.0e+01	2.2e+00	1.0e+01	5.3e+01	7.5e+01	4.0e+00	4.3e-01	2.1e+00	1.0e+01	1.5e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.2 Normalized effective dose equivalents from external exposure: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	3.2e-05	3.1e-06	1.6e-05	8.1e-05	1.2e-04	6.3e-06	6.3e-07	3.2e-06	1.6e-05	2.3e-05
Na-22	4.2e+01	4.2e+00	2.1e+01	1.1e+02	1.6e+02	8.3e+00	8.4e-01	4.2e+00	2.1e+01	3.0e+01
P-32	5.3e-02	5.1e-03	2.7e-02	1.4e-01	2.0e-01	1.1e-02	1.0e-03	5.3e-03	2.7e-02	3.9e-02
S-35	3.0e-05	3.0e-06	1.5e-05	7.7e-05	1.1e-04	5.9e-06	5.9e-07	3.0e-06	1.5e-05	2.2e-05
Cl-36	1.2e-02	1.2e-03	6.0e-03	3.0e-02	4.3e-02	2.3e-03	2.4e-04	1.2e-03	6.0e-03	8.5e-03
K-40	3.4e+00	3.4e-01	1.7e+00	8.7e+00	1.2e+01	6.7e-01	6.8e-02	3.4e-01	1.7e+00	2.4e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.0e-04	2.0e-05	1.0e-04	5.0e-04	7.3e-04	3.9e-05	3.9e-06	2.0e-05	1.0e-04	1.4e-04
Sc-46	3.8e+01	3.7e+00	1.9e+01	9.7e+01	1.4e+02	7.4e+00	7.4e-01	3.8e+00	1.9e+01	2.7e+01
Cr-51	3.5e-01	3.4e-02	1.8e-01	9.0e-01	1.3e+00	6.9e-02	6.8e-03	3.5e-02	1.8e-01	2.5e-01
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.6e+01	1.6e+00	8.1e+00	4.1e+01	5.9e+01	3.2e+00	3.2e-01	1.6e+00	8.1e+00	1.2e+01
Fe-55	7.5e-10	7.5e-11	3.8e-10	1.9e-09	2.8e-09	1.5e-10	1.5e-11	7.5e-11	3.8e-10	5.4e-10
Fe-59	2.1e+01	2.1e+00	1.1e+01	5.4e+01	7.8e+01	4.2e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01
Co-56	6.8e+01	6.7e+00	3.4e+01	1.7e+02	2.5e+02	1.3e+01	1.3e+00	6.8e+00	3.5e+01	4.9e+01
Co-57	5.5e-01	5.5e-02	2.8e-01	1.4e+00	2.0e+00	1.1e-01	1.1e-02	5.5e-02	2.8e-01	4.0e-01
Co-58	1.7e+01	1.7e+00	8.6e+00	4.4e+01	6.3e+01	3.3e+00	3.3e-01	1.7e+00	8.7e+00	1.2e+01
Co-60	5.2e+01	5.2e+00	2.7e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.7e+01	3.8e+01
Ni-59	2.7e-04	2.7e-05	1.4e-04	7.0e-04	1.0e-03	5.4e-05	5.5e-06	2.7e-05	1.4e-04	2.0e-04
Ni-63	3.7e-07	3.6e-08	1.8e-07	9.3e-07	1.3e-06	7.2e-08	7.3e-09	3.7e-08	1.9e-07	2.6e-07
Zn-65	1.2e+01	1.1e+00	5.8e+00	2.9e+01	4.3e+01	2.3e+00	2.3e-01	1.2e+00	5.9e+00	8.3e+00
As-73	3.4e-03	3.3e-04	1.7e-03	8.7e-03	1.3e-02	6.7e-04	6.7e-05	3.4e-04	1.7e-03	2.5e-03
Se-75	3.9e+00	3.9e-01	2.0e+00	1.0e+01	1.4e+01	7.8e-01	7.8e-02	3.9e-01	2.0e+00	2.8e+00
Sr-85	7.6e+00	2.5e-01	3.9e+00	2.0e+01	2.8e+01	1.5e+00	1.5e-01	7.6e-01	3.9e+00	5.5e+00
Sr-89	5.8e-02	5.8e-03	3.0e-02	1.5e-01	2.2e-01	1.2e-02	1.1e-03	5.8e-03	3.0e-02	4.3e-02
Sr-90	1.9e-01	1.9e-02	9.4e-02	4.8e-01	6.9e-01	3.7e-02	3.7e-03	1.9e-02	9.5e-02	1.3e-01
Y-91	1.3e-01	1.3e-02	6.5e-02	3.3e-01	4.8e-01	2.5e-02	2.5e-03	1.3e-02	6.6e-02	9.4e-02
Zr-93	4.6e-07	4.6e-08	2.3e-07	1.2e-06	1.7e-06	9.2e-08	9.2e-09	4.6e-08	2.3e-07	3.3e-07
Zr-95	1.5e+01	1.5e+00	7.6e+00	3.8e+01	5.5e+01	3.0e+00	3.0e-01	1.5e+00	7.6e+00	1.1e+01
Nb-93m	3.3e-05	3.3e-06	1.7e-05	8.4e-05	1.2e-04	6.5e-06	6.6e-07	3.3e-06	1.7e-05	2.4e-05
Nb-94	3.0e+01	3.0e+00	1.5e+01	7.7e+01	1.1e+02	6.0e+00	6.0e-01	3.0e+00	1.5e+01	2.2e+01
Nb-95	1.2e+01	1.2e+00	6.1e+00	3.1e+01	4.5e+01	2.4e+00	2.4e-01	1.2e+00	6.2e+00	8.8e+00
Mo-93	1.8e-04	1.8e-05	8.9e-05	4.5e-04	6.5e-04	3.5e-05	3.5e-06	1.8e-05	9.0e-05	1.3e-04
Tc-97	2.4e-04	2.3e-05	1.2e-04	6.0e-04	8.7e-04	4.7e-05	4.7e-06	2.4e-05	1.2e-04	1.7e-04
Tc-97m	1.0e-03	1.0e-04	5.2e-04	2.7e-03	3.8e-03	2.0e-04	2.0e-05	1.0e-04	5.3e-04	7.5e-04
Tc-99	4.1e-04	4.1e-05	2.1e-04	1.1e-03	1.5e-03	8.2e-05	8.3e-06	4.1e-05	2.1e-04	3.0e-04
Ru-103	7.1e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.1e-01	3.6e+00	5.2e+00
Ru-106	4.1e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01	8.2e-01	8.2e-02	4.1e-01	2.1e+00	3.0e+00
Ag-108m	2.9e+01	2.9e+00	1.5e+01	7.4e+01	1.1e+02	5.7e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Ag-110m	5.2e+01	5.2e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.7e+01	3.8e+01
Cd-109	8.2e-03	8.2e-04	4.2e-03	2.1e-02	3.0e-02	1.6e-03	1.6e-04	8.3e-04	4.2e-03	6.0e-03
Sn-113	3.7e+00	3.7e-01	1.9e+00	9.6e+00	1.4e+01	7.4e-01	7.5e-02	3.7e-01	1.9e+00	2.7e+00
Sb-124	3.3e+01	3.3e+00	1.7e+01	8.6e+01	1.2e+02	6.6e+00	6.6e-01	3.3e+00	1.7e+01	2.4e+01
Sb-125	7.1e+00	7.1e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.1e-01	3.6e+00	5.1e+00
Te-123m	8.7e-01	8.6e-02	4.4e-01	2.2e+00	3.2e+00	1.7e-01	1.7e-02	8.7e-02	4.5e-01	6.3e-01
Te-127m	7.7e-02	7.6e-03	3.9e-02	2.0e-01	2.8e-01	1.5e-02	1.5e-03	7.7e-03	3.9e-02	5.6e-02
I-125	4.4e-03	4.3e-04	2.2e-03	1.1e-02	1.6e-02	8.7e-04	8.6e-05	4.4e-04	2.2e-03	3.2e-03
I-129	4.0e-03	3.9e-04	2.0e-03	1.0e-02	1.5e-02	7.9e-04	7.9e-05	4.0e-04	2.0e-03	2.9e-03
I-131	2.6e+00	2.2e-01	1.3e+00	6.9e+00	1.0e+01	5.2e-01	4.4e-02	2.5e-01	1.4e+00	2.0e+00
Cs-134	2.9e+01	2.9e+00	1.5e+01	7.4e+01	1.1e+02	5.8e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Cs-135	3.2e-04	3.2e-05	1.6e-04	8.2e-04	1.2e-03	6.4e-05	6.4e-06	3.2e-05	1.6e-04	2.3e-04
Cs-137	1.0e+01	1.0e+00	5.3e+00	2.7e+01	3.8e+01	2.1e+00	2.1e-01	1.0e+00	5.3e+00	7.5e+00
Ba-133	4.9e+00	4.9e-01	2.5e+00	1.2e+01	1.8e+01	9.7e-01	9.7e-02	4.9e-01	2.5e+00	3.5e+00
Ce-139	9.2e-01	9.1e-02	4.7e-01	2.4e+00	3.4e+00	1.8e-01	1.8e-02	9.2e-02	4.7e-01	6.7e-01
Ce-141	3.4e-01	3.4e-02	1.7e-01	8.9e-01	1.3e+00	6.8e-02	6.7e-03	3.4e-02	1.8e-01	2.5e-01
Ce-144	9.8e-01	9.7e-02	4.9e-01	2.5e+00	3.6e+00	1.9e-01	1.9e-02	9.8e-02	5.0e-01	7.1e-01
Pm-147	1.2e-04	1.2e-05	6.3e-05	3.2e-04	4.6e-04	2.5e-05	2.5e-06	1.2e-05	6.3e-05	9.0e-05

Table F1.2 Normalized effective dose equivalents from external exposure: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.4e-06	1.4e-07	6.9e-07	3.5e-06	5.0e-06	2.7e-07	2.7e-08	1.4e-07	6.9e-07	9.8e-07
Eu-152	2.2e+01	2.2e+00	1.1e+01	5.6e+01	8.1e+01	4.3e+00	4.4e-01	2.2e+00	1.1e+01	1.6e+01
Eu-154	2.2e+01	2.1e+00	1.1e+01	5.5e+01	8.0e+01	4.3e+00	4.3e-01	2.2e+00	1.1e+01	1.6e+01
Eu-155	1.4e-01	1.4e-02	6.9e-02	3.5e-01	5.0e-01	2.7e-02	2.7e-03	1.4e-02	6.9e-02	9.8e-02
Gd-153	1.7e-01	1.7e-02	8.7e-02	4.4e-01	6.3e-01	3.4e-02	3.4e-03	1.7e-02	8.7e-02	1.2e-01
Tb-160	2.0e+01	1.9e+00	1.0e+01	5.1e+01	7.3e+01	3.9e+00	3.9e-01	2.0e+00	1.0e+01	1.4e+01
Tm-170	1.7e-02	1.7e-03	8.8e-03	4.4e-02	6.4e-02	3.4e-03	3.4e-04	1.7e-03	8.8e-03	1.3e-02
Tm-171	4.4e-04	4.3e-05	2.2e-04	1.1e-03	1.6e-03	8.7e-05	8.7e-06	4.4e-05	2.2e-04	3.2e-04
Ta-182	2.3e+01	2.3e+00	1.2e+01	6.0e+01	8.6e+01	4.6e+00	4.6e-01	2.3e+00	1.2e+01	1.7e+01
W-181	3.1e-02	3.0e-03	1.5e-02	7.8e-02	1.1e-01	6.1e-03	6.1e-04	3.1e-03	1.6e-02	2.2e-02
W-185	1.3e-03	1.3e-04	6.6e-04	3.4e-03	4.8e-03	2.6e-04	2.6e-05	1.3e-04	6.7e-04	9.4e-04
Os-185	1.1e+01	1.1e+00	5.7e+00	2.9e+01	4.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Ir-192	1.1e+01	1.1e+00	5.7e+00	2.9e+01	4.2e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Tl-204	9.9e-03	9.8e-04	5.0e-03	2.5e-02	3.6e-02	2.0e-03	2.0e-04	9.8e-04	5.0e-03	7.1e-03
Pb-210	2.3e-02	2.3e-03	1.2e-02	5.9e-02	8.5e-02	4.6e-03	4.6e-04	2.3e-03	1.2e-02	1.7e-02
Bi-207	2.9e+01	2.9e+00	1.5e+01	7.4e+01	1.1e+02	5.7e+00	5.8e-01	2.9e+00	1.5e+01	2.1e+01
Po-210	1.8e-04	1.8e-05	9.1e-05	4.6e-04	6.7e-04	3.6e-05	3.8e-06	1.8e-05	9.2e-05	1.3e-04
Ra-226	3.4e+01	3.4e+00	1.7e+01	8.7e+01	1.3e+02	6.7e+00	6.8e-01	3.4e+00	1.7e+01	2.5e+01
Ra-228	1.7e+01	1.7e+00	8.5e+00	4.3e+01	6.2e+01	3.3e+00	3.4e-01	1.7e+00	8.6e+00	1.2e+01
Ac-227	5.1e+00	5.1e-01	2.6e+00	1.3e+01	1.9e+01	1.0e+00	1.0e-01	5.1e-01	2.6e+00	3.7e+00
Th-228	2.9e+01	2.8e+00	1.4e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Th-229	3.7e+00	3.7e-01	1.9e+00	9.5e+00	1.4e+01	7.3e-01	7.4e-02	3.7e-01	1.9e+00	2.7e+00
Th-230	1.7e-03	1.7e-04	8.4e-04	4.2e-03	6.1e-03	3.3e-04	3.3e-05	1.7e-04	8.4e-04	1.2e-03
Th-232	5.5e-02	4.2e-03	2.6e-02	1.4e-01	2.1e-01	1.1e-02	8.5e-04	5.2e-03	2.8e-02	4.1e-02
Pa-231	4.1e-01	4.1e-02	2.1e-01	1.1e+00	1.5e+00	8.2e-02	8.3e-03	4.1e-02	2.1e-01	3.0e-01
U-232	2.8e-01	2.2e-02	1.4e-01	7.4e-01	1.1e+00	5.6e-02	4.4e-03	2.7e-02	1.4e-01	2.1e-01
U-233	1.7e-03	1.7e-04	8.6e-04	4.4e-03	6.3e-03	3.4e-04	3.4e-05	1.7e-04	8.7e-04	1.2e-03
U-234	3.0e-04	3.0e-05	1.5e-04	7.8e-04	1.1e-03	6.0e-05	6.1e-06	3.0e-05	1.5e-04	2.2e-04
U-235	1.3e+00	1.3e-01	6.6e-01	3.4e+00	4.8e+00	2.6e-01	2.6e-02	1.3e-01	6.7e-01	9.5e-01
U-236	1.3e-04	1.3e-05	6.7e-05	3.4e-04	4.9e-04	2.6e-05	2.6e-06	1.3e-05	6.7e-05	9.5e-05
U-238	5.1e-01	5.1e-02	2.6e-01	1.3e+00	1.9e+00	1.0e-01	1.0e-02	5.1e-02	2.6e-01	3.7e-01
Np-237	2.6e+00	2.6e-01	1.3e+00	6.6e+00	9.6e+00	5.1e-01	5.2e-02	2.6e-01	1.3e+00	1.9e+00
Pu-236	2.0e-04	2.0e-05	1.0e-04	5.1e-04	7.3e-04	4.0e-05	3.9e-06	2.0e-05	1.0e-04	1.4e-04
Pu-238	7.2e-05	7.2e-06	3.7e-05	1.9e-04	2.7e-04	1.4e-05	1.4e-06	7.2e-06	3.7e-05	5.2e-05
Pu-239	5.1e-04	5.1e-05	2.6e-04	1.3e-03	1.9e-03	1.0e-04	1.0e-05	5.1e-05	2.6e-04	3.7e-04
Pu-240	6.7e-05	6.7e-06	3.4e-05	1.7e-04	2.5e-04	1.3e-05	1.3e-06	6.7e-06	3.4e-05	4.8e-05
Pu-241	6.3e-06	6.3e-07	3.2e-06	1.6e-05	2.3e-05	1.2e-06	1.3e-07	6.3e-07	3.2e-06	4.6e-06
Pu-242	6.0e-05	6.0e-06	3.1e-05	1.5e-04	2.2e-04	1.2e-05	1.2e-06	6.0e-06	3.1e-05	4.3e-05
Pu-244	6.0e+00	6.0e-01	3.0e+00	1.5e+01	2.2e+01	1.2e+00	1.2e-01	6.0e-01	3.0e+00	4.3e+00
Am-241	1.9e-02	1.9e-03	9.6e-03	4.9e-02	7.0e-02	3.8e-03	3.8e-04	1.9e-03	9.6e-03	1.4e-02
Am-242m	1.1e-01	1.1e-02	5.4e-02	2.7e-01	3.9e-01	2.1e-02	2.1e-03	1.1e-02	5.4e-02	7.7e-02
Am-243	1.4e+00	1.4e-01	7.3e-01	3.7e+00	5.3e+00	2.8e-01	2.9e-02	1.4e-01	7.3e-01	1.0e+00
Cm-242	9.1e-05	9.0e-06	4.6e-05	2.3e-04	3.4e-04	1.8e-05	1.8e-06	9.1e-06	4.6e-05	6.6e-05
Cm-243	1.0e+00	1.0e-01	5.2e-01	2.6e+00	3.8e+00	2.0e-01	2.1e-02	1.0e-01	5.2e-01	7.4e-01
Cm-244	8.0e-05	8.0e-06	4.1e-05	2.1e-04	3.0e-04	1.6e-05	1.6e-06	8.0e-06	4.1e-05	5.8e-05
Cm-245	4.1e-01	4.1e-02	2.1e-01	1.1e+00	1.5e+00	8.2e-02	8.2e-03	4.1e-02	2.1e-01	3.0e-01
Cm-246	2.9e-05	2.9e-06	1.5e-05	7.4e-05	1.1e-04	5.7e-06	5.8e-07	2.9e-06	1.5e-05	2.1e-05
Cm-247	4.9e+00	4.9e-01	2.5e+00	1.3e+01	1.8e+01	9.7e-01	9.8e-02	4.9e-01	2.5e+00	3.5e+00
Cm-248	2.6e-05	2.6e-06	1.3e-05	6.8e-05	9.7e-05	5.2e-06	5.3e-07	2.6e-06	1.3e-05	1.9e-05
Bk-249	2.7e-04	2.2e-05	1.3e-04	7.0e-04	1.0e-03	5.4e-05	4.3e-06	2.6e-05	1.4e-04	2.0e-04
Cf-248	9.5e-05	9.4e-06	4.8e-05	2.4e-04	3.5e-04	1.9e-05	1.9e-06	9.5e-06	4.8e-05	6.9e-05
Cf-249	4.8e+00	4.8e-01	2.4e+00	1.2e+01	1.8e+01	9.5e-01	9.6e-02	4.8e-01	2.5e+00	3.5e+00
Cf-250	3.3e-05	3.2e-06	1.6e-05	8.3e-05	1.2e-04	6.4e-06	6.5e-07	3.3e-06	1.7e-05	2.3e-05
Cf-251	7.4e-01	7.3e-02	3.7e-01	1.9e+00	2.7e+00	1.5e-01	1.5e-02	7.4e-02	3.7e-01	5.3e-01
Cf-252	9.4e-05	9.3e-06	4.7e-05	2.4e-04	3.5e-04	1.9e-05	1.9e-06	9.4e-06	4.7e-05	6.8e-05
Cf-254	3.1e+02	3.1e+01	1.6e+02	8.0e+02	1.2e+03	6.2e+01	6.1e+00	3.1e+01	1.6e+02	2.3e+02
Es-254	1.8e+01	1.7e+00	8.9e+00	4.5e+01	6.5e+01	3.5e+00	3.5e-01	1.8e+00	9.0e+00	1.3e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.3 Normalized effective dose equivalents from inhalation: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	4.2e-06	4.9e-07	2.2e-06	1.1e-05	1.5e-05	8.4e-07	9.7e-08	4.3e-07	2.2e-06	3.0e-06
C-14	1.4e-04	1.6e-05	7.2e-05	3.6e-04	5.0e-04	2.7e-05	3.2e-06	1.4e-05	7.1e-05	9.9e-05
Na-22	5.0e-04	5.8e-05	2.6e-04	1.3e-03	1.8e-03	9.9e-05	1.2e-05	5.2e-05	2.6e-04	3.6e-04
P-32	6.4e-04	8.9e-05	3.3e-04	1.7e-03	2.3e-03	1.3e-04	1.4e-05	6.5e-05	3.4e-04	4.6e-04
S-35	1.5e-04	1.7e-05	7.9e-05	4.0e-04	5.5e-04	3.0e-05	3.5e-06	1.6e-05	7.8e-05	1.1e-04
Cl-36	1.4e-03	1.7e-04	7.6e-04	3.8e-03	5.2e-03	2.9e-04	3.3e-05	1.5e-04	7.5e-04	1.0e-03
K-40	8.2e-04	9.4e-05	4.3e-04	2.2e-03	2.9e-03	1.6e-04	1.9e-05	8.4e-05	4.2e-04	5.9e-04
Ca-41	8.9e-05	1.0e-05	4.7e-05	2.3e-04	3.2e-04	1.8e-05	2.0e-06	9.2e-06	4.6e-05	6.4e-05
Ca-45	4.2e-04	4.8e-05	2.2e-04	1.1e-03	1.5e-03	8.3e-05	9.6e-06	4.3e-05	2.2e-04	3.0e-04
Sc-46	1.8e-03	2.1e-04	9.5e-04	4.7e-03	6.5e-03	3.6e-04	4.1e-05	1.9e-04	9.3e-04	1.3e-03
Cr-51	1.7e-05	1.9e-06	9.0e-06	4.6e-05	6.2e-05	3.4e-06	3.9e-07	1.8e-06	9.0e-06	1.2e-05
Mn-53	3.3e-05	3.8e-06	1.7e-05	8.7e-05	1.2e-04	6.5e-06	7.6e-07	3.4e-06	1.7e-05	2.4e-05
Mn-54	4.3e-04	5.0e-05	2.3e-04	1.1e-03	1.6e-03	8.6e-05	9.9e-06	4.5e-05	2.2e-04	3.1e-04
Fe-55	1.8e-04	2.0e-05	9.2e-05	4.7e-04	6.3e-04	3.5e-05	4.1e-06	1.8e-05	9.1e-05	1.3e-04
Fe-59	8.4e-04	9.6e-05	4.4e-04	2.2e-03	3.0e-03	1.7e-04	1.9e-05	8.7e-05	4.4e-04	6.0e-04
Co-56	2.4e-03	2.8e-04	1.3e-03	6.3e-03	8.7e-03	4.7e-04	5.5e-05	2.5e-04	1.2e-03	1.7e-03
Co-57	5.8e-04	6.7e-05	3.1e-04	1.5e-03	2.1e-03	1.2e-04	1.3e-05	6.0e-05	3.0e-04	4.2e-04
Co-58	6.5e-04	7.5e-05	3.4e-04	1.7e-03	2.4e-03	1.3e-04	1.5e-05	6.7e-05	3.4e-04	4.6e-04
Co-60	1.4e-02	1.7e-03	7.6e-03	3.8e-02	5.2e-02	2.9e-03	3.3e-04	1.5e-03	7.5e-03	1.0e-02
Ni-59	6.8e-05	1.0e-05	4.6e-05	2.3e-04	3.2e-04	1.7e-05	2.0e-06	9.0e-06	4.5e-05	6.3e-05
Ni-63	2.1e-04	2.4e-05	1.1e-04	5.4e-04	7.4e-04	4.1e-05	4.7e-06	2.1e-05	1.1e-04	1.5e-04
Zn-65	1.3e-03	1.5e-04	6.9e-04	3.5e-03	4.7e-03	2.6e-04	3.0e-05	1.4e-04	6.8e-04	9.4e-04
As-73	2.1e-04	2.4e-05	1.1e-04	5.5e-04	7.6e-04	4.2e-05	4.8e-06	2.2e-05	1.1e-04	1.5e-04
Se-75	5.3e-04	6.1e-05	2.8e-04	1.4e-03	1.9e-03	1.0e-04	1.2e-05	5.4e-05	2.7e-04	3.8e-04
Sr-85	1.1e-04	1.3e-05	6.0e-05	3.0e-04	4.1e-04	2.3e-05	2.6e-06	1.2e-05	5.9e-05	8.1e-05
Sr-89	3.8e-04	4.3e-05	2.0e-04	9.9e-04	1.4e-03	7.4e-05	8.6e-06	3.9e-05	2.0e-04	2.7e-04
Sr-90	1.6e-02	1.9e-03	8.6e-03	4.3e-02	5.9e-02	3.2e-03	3.8e-04	1.7e-03	8.5e-03	1.2e-02
Y-91	2.9e-03	3.3e-04	1.5e-03	7.6e-03	1.0e-02	5.7e-04	6.6e-05	3.0e-04	1.5e-03	2.1e-03
Zr-93	5.5e-03	6.3e-04	2.9e-03	1.5e-02	2.0e-02	1.1e-03	1.3e-04	5.7e-04	2.8e-03	4.0e-03
Zr-95	1.0e-03	1.2e-04	5.3e-04	2.7e-03	3.6e-03	2.0e-04	2.3e-05	1.0e-04	5.2e-04	7.2e-04
Nb-93m	1.9e-03	2.2e-04	1.0e-03	5.1e-03	6.9e-03	3.8e-04	4.4e-05	2.0e-04	1.0e-03	1.4e-03
Nb-94	2.7e-02	3.2e-03	1.4e-02	7.2e-02	9.9e-02	5.4e-03	6.3e-04	2.8e-03	1.4e-02	2.0e-02
Nb-95	3.2e-04	3.6e-05	1.6e-04	8.4e-04	1.1e-03	6.3e-05	7.2e-06	3.3e-05	1.6e-04	2.3e-04
Mo-93	1.9e-03	2.2e-04	9.9e-04	5.0e-03	6.8e-03	3.7e-04	4.3e-05	1.9e-04	9.7e-04	1.3e-03
Tc-97	6.6e-05	7.5e-06	3.4e-05	1.7e-04	2.4e-04	1.3e-05	1.5e-06	6.7e-06	3.4e-05	4.7e-05
Tc-97m	3.0e-04	3.4e-05	1.6e-04	7.9e-04	1.1e-03	5.9e-05	6.8e-06	3.1e-05	1.5e-04	2.1e-04
Tc-99	5.5e-04	6.3e-05	2.9e-04	1.5e-03	2.0e-03	1.1e-04	1.3e-05	5.7e-05	2.8e-04	3.9e-04
Ru-103	5.0e-04	5.6e-05	2.6e-04	1.3e-03	1.8e-03	9.9e-05	1.1e-05	5.1e-05	2.6e-04	3.6e-04
Ru-106	3.1e-02	3.6e-03	1.6e-02	8.2e-02	1.1e-01	6.1e-03	7.1e-04	3.2e-03	1.6e-02	2.2e-02
Ag-108m	1.9e-02	2.2e-03	9.8e-03	4.9e-02	6.7e-02	3.7e-03	4.3e-04	1.9e-03	9.7e-03	1.3e-02
Ag-110m	5.2e-03	5.9e-04	2.7e-03	1.4e-02	1.9e-02	1.0e-03	1.2e-04	5.3e-04	2.7e-03	3.7e-03
Cd-109	7.4e-03	8.5e-04	3.9e-03	2.0e-02	2.7e-02	1.5e-03	1.7e-04	7.7e-04	3.8e-03	5.3e-03
Sn-113	6.7e-04	7.6e-05	3.5e-04	1.8e-03	2.4e-03	1.3e-04	1.5e-05	6.9e-05	3.4e-04	4.7e-04
Sb-124	1.5e-03	1.7e-04	7.8e-04	3.9e-03	5.4e-03	2.9e-04	3.4e-05	1.5e-04	7.7e-04	1.1e-03
Sb-125	9.1e-04	1.0e-04	4.8e-04	2.4e-03	3.3e-03	1.8e-04	2.1e-05	9.4e-05	4.7e-04	6.5e-04
Te-123m	6.6e-04	7.6e-05	3.5e-04	1.7e-03	2.4e-03	1.3e-04	1.5e-05	6.8e-05	3.4e-04	4.7e-04
Te-127m	1.4e-03	1.6e-04	7.1e-04	3.6e-03	4.9e-03	2.7e-04	3.1e-05	1.4e-04	7.0e-04	9.7e-04
I-125	1.4e-03	1.6e-04	7.5e-04	3.8e-03	5.1e-03	2.8e-04	3.3e-05	1.5e-04	7.4e-04	1.0e-03
I-129	1.1e-02	1.3e-03	6.0e-03	3.0e-02	4.1e-02	2.3e-03	2.6e-04	1.2e-03	5.9e-03	8.2e-03
I-131	9.8e-04	9.2e-05	4.9e-04	2.6e-03	3.6e-03	1.9e-04	1.8e-05	9.7e-05	5.1e-04	7.2e-04
Cs-134	3.0e-03	3.5e-04	1.6e-03	8.0e-03	1.1e-02	6.0e-04	7.0e-05	3.1e-04	1.6e-03	2.2e-03
Cs-135	3.0e-04	3.5e-05	1.6e-04	7.9e-04	1.1e-03	6.0e-05	6.9e-06	3.1e-05	1.6e-04	2.2e-04
Cs-137	2.1e-03	2.4e-04	1.1e-03	5.6e-03	7.6e-03	4.2e-04	4.9e-05	2.2e-04	1.1e-03	1.5e-03
Ba-133	5.1e-04	5.9e-05	2.7e-04	1.4e-03	1.9e-03	1.0e-04	1.2e-05	5.3e-05	2.7e-04	3.7e-04
Ce-139	5.7e-04	6.5e-05	3.0e-04	1.5e-03	2.1e-03	1.1e-04	1.3e-05	5.9e-05	2.9e-04	4.1e-04
Ce-141	4.8e-04	5.4e-05	2.5e-04	1.3e-03	1.7e-03	9.5e-05	1.1e-05	4.9e-05	2.5e-04	3.4e-04
Ce-144	2.4e-02	2.8e-03	1.3e-02	6.4e-02	8.7e-02	4.8e-03	5.5e-04	2.5e-03	1.2e-02	1.7e-02
Pm-147	2.6e-03	3.0e-04	1.3e-03	6.8e-03	9.3e-03	5.1e-04	5.9e-05	2.6e-04	1.3e-03	1.8e-03

Table F1.3 Normalized effective dose equivalents from inhalation: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-03	2.3e-04	1.0e-03	5.2e-03	7.1e-03	3.9e-04	4.6e-05	2.0e-04	1.0e-03	1.4e-03
Eu-152	1.5e-02	1.7e-03	7.6e-03	3.8e-02	5.2e-02	2.9e-03	3.4e-04	1.5e-03	7.5e-03	1.0e-02
Eu-154	1.9e-02	2.2e-03	9.9e-03	5.0e-02	6.8e-02	3.7e-03	4.3e-04	1.9e-03	9.8e-03	1.4e-02
Eu-155	2.7e-03	3.1e-04	1.4e-03	7.2e-03	9.8e-03	5.4e-04	6.3e-05	2.8e-04	1.4e-03	2.0e-03
Gd-153	6.1e-04	7.0e-05	3.2e-04	1.6e-03	2.2e-03	1.2e-04	1.4e-05	6.3e-05	3.1e-04	4.4e-04
Tb-160	1.5e-03	1.7e-04	7.8e-04	4.0e-03	5.4e-03	3.0e-04	3.4e-05	1.5e-04	7.8e-04	1.1e-03
Tm-170	1.6e-03	1.9e-04	8.7e-04	4.3e-03	5.9e-03	3.3e-04	3.8e-05	1.7e-04	8.5e-04	1.2e-03
Tm-171	6.0e-04	6.9e-05	3.1e-04	1.6e-03	2.2e-03	1.2e-04	1.4e-05	6.2e-05	3.1e-04	4.3e-04
Ta-182	2.8e-03	3.2e-04	1.5e-03	7.4e-03	1.0e-02	5.5e-04	6.4e-05	2.9e-04	1.4e-03	2.0e-03
W-181	9.4e-06	1.1e-06	5.0e-06	2.5e-05	3.4e-05	1.9e-06	2.2e-07	9.7e-07	4.9e-06	6.7e-06
W-185	4.5e-05	5.2e-06	2.4e-05	1.2e-04	1.6e-04	9.0e-06	1.0e-06	4.7e-06	2.3e-05	3.2e-05
Os-185	6.1e-04	7.0e-05	3.2e-04	1.6e-03	2.2e-03	1.2e-04	1.4e-05	6.3e-05	3.1e-04	4.3e-04
Ir-192	1.7e-03	1.9e-04	8.9e-04	4.5e-03	6.1e-03	3.4e-04	3.9e-05	1.7e-04	8.8e-04	1.2e-03
Tl-204	1.6e-04	1.8e-05	8.3e-05	4.2e-04	5.7e-04	3.1e-05	3.6e-06	1.6e-05	8.2e-05	1.1e-04
Pb-210	1.5e+00	1.7e-01	7.7e-01	3.9e+00	5.3e+00	2.9e-01	3.4e-02	1.5e-01	7.6e-01	1.1e+00
Bi-207	1.3e-03	1.5e-04	6.9e-04	3.5e-03	4.8e-03	2.6e-04	3.0e-05	1.4e-04	6.8e-04	9.5e-04
Po-210	5.4e-01	6.2e-02	2.8e-01	1.4e+00	1.9e+00	1.1e-01	1.2e-02	5.6e-02	2.8e-01	3.9e-01
Ra-226	5.7e-01	6.5e-02	3.0e-01	1.5e+00	2.0e+00	1.1e-01	1.3e-02	5.9e-02	2.9e-01	4.1e-01
Ra-228	4.9e-01	5.5e-02	2.5e-01	1.3e+00	1.7e+00	9.5e-02	1.1e-02	5.0e-02	2.5e-01	3.5e-01
Ac-227	8.7e+01	1.0e+01	4.6e+01	2.3e+02	3.1e+02	1.7e+01	2.0e+00	8.9e+00	4.5e+01	6.2e+01
Th-228	1.7e+01	1.9e+00	8.7e+00	4.4e+01	6.0e+01	3.3e+00	3.8e-01	1.7e+00	8.5e+00	1.2e+01
Th-229	1.4e+02	1.6e+01	7.5e+01	3.8e+02	5.1e+02	2.8e+01	3.3e+00	1.5e+01	7.4e+01	1.0e+02
Th-230	2.2e+01	2.5e+00	1.1e+01	5.7e+01	7.7e+01	4.3e+00	5.0e-01	2.2e+00	1.1e+01	1.5e+01
Th-232	1.1e+02	1.2e+01	5.7e+01	2.9e+02	3.9e+02	2.1e+01	2.5e+00	1.1e+01	5.6e+01	7.8e+01
Pa-231	8.5e+01	9.8e+00	4.5e+01	2.2e+02	3.1e+02	1.7e+01	2.0e+00	8.7e+00	4.4e+01	6.1e+01
U-232	4.4e+01	5.0e+00	2.3e+01	1.1e+02	1.6e+02	8.6e+00	1.0e+00	4.5e+00	2.3e+01	3.1e+01
U-233	8.9e+00	1.0e+00	4.7e+00	2.4e+01	3.2e+01	1.8e+00	2.1e-01	9.2e-01	4.6e+00	6.4e+00
U-234	8.8e+00	1.0e+00	4.6e+00	2.3e+01	3.2e+01	1.7e+00	2.0e-01	9.0e-01	4.5e+00	6.3e+00
U-235	8.1e+00	9.3e-01	4.3e+00	2.1e+01	2.9e+01	1.6e+00	1.9e-01	8.4e-01	4.2e+00	5.8e+00
U-236	8.3e+00	9.5e-01	4.3e+00	2.2e+01	3.0e+01	1.6e+00	1.9e-01	8.5e-01	4.3e+00	5.9e+00
U-238	7.8e+00	9.0e-01	4.1e+00	2.1e+01	2.8e+01	1.5e+00	1.8e-01	8.1e-01	4.1e+00	5.6e+00
Np-237	3.8e+01	4.1e+00	1.9e+01	9.4e+01	1.3e+02	7.1e+00	8.2e-01	3.7e+00	1.8e+01	2.6e+01
Pu-236	9.5e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.8e-01	4.9e+00	6.8e+00
Pu-238	2.6e+01	3.0e+00	1.4e+01	6.8e+01	9.3e+01	5.1e+00	6.0e-01	2.7e+00	1.3e+01	1.9e+01
Pu-239	2.8e+01	3.3e+00	1.5e+01	7.5e+01	1.0e+02	5.6e+00	6.5e-01	2.9e+00	1.5e+01	2.0e+01
Pu-240	2.8e+01	3.3e+00	1.5e+01	7.5e+01	1.0e+02	5.6e+00	6.5e-01	2.9e+00	1.5e+01	2.0e+01
Pu-241	5.5e-01	6.3e-02	2.9e-01	1.4e+00	2.0e+00	1.1e-01	1.3e-02	5.6e-02	2.8e-01	3.9e-01
Pu-242	2.7e+01	3.1e+00	1.4e+01	7.2e+01	9.8e+01	5.4e+00	6.2e-01	2.8e+00	1.4e+01	1.9e+01
Pu-244	2.7e+01	3.1e+00	1.4e+01	7.0e+01	9.6e+01	5.3e+00	6.1e-01	2.7e+00	1.4e+01	1.9e+01
Am-241	2.9e+01	3.4e+00	1.5e+01	7.7e+01	1.1e+02	5.8e+00	6.8e-01	3.0e+00	1.5e+01	2.1e+01
Am-242m	2.9e+01	3.3e+00	1.5e+01	7.7e+01	1.0e+02	5.8e+00	6.7e-01	3.0e+00	1.5e+01	2.1e+01
Am-243	2.9e+01	3.3e+00	1.5e+01	7.7e+01	1.0e+02	5.8e+00	6.7e-01	3.0e+00	1.5e+01	2.1e+01
Cm-242	1.1e+00	1.3e-01	5.8e-01	2.9e+00	4.0e+00	2.2e-01	2.5e-02	1.1e-01	5.7e-01	7.9e-01
Cm-243	2.0e+01	2.3e+00	1.1e+01	5.3e+01	7.3e+01	4.0e+00	4.7e-01	2.1e+00	1.1e+01	1.5e+01
Cm-244	1.5e+01	1.9e+00	6.6e+00	4.3e+01	5.9e+01	3.2e+00	3.8e-01	1.7e+00	8.5e+00	1.2e+01
Cm-245	3.0e+01	3.5e+00	1.6e+01	7.9e+01	1.1e+02	6.0e+00	6.9e-01	3.1e+00	1.6e+01	2.2e+01
Cm-246	3.0e+01	3.4e+00	1.6e+01	7.9e+01	1.1e+02	5.9e+00	6.9e-01	3.1e+00	1.5e+01	2.1e+01
Cm-247	2.7e+01	3.2e+00	1.4e+01	7.2e+01	9.9e+01	5.4e+00	6.3e-01	2.8e+00	1.4e+01	2.0e+01
Cm-248	1.1e+02	1.3e+01	5.7e+01	2.9e+02	3.9e+02	2.2e+01	2.5e+00	1.1e+01	5.7e+01	7.8e+01
Bk-249	9.1e-02	1.0e-02	4.8e-02	2.4e-01	3.3e-01	1.8e-02	2.1e-03	9.4e-03	4.7e-02	6.5e-02
Cf-248	3.3e+00	3.8e-01	1.7e+00	8.7e+00	1.2e+01	6.5e-01	7.6e-02	3.4e-01	1.7e+00	2.4e+00
Cf-249	2.5e+01	2.9e+00	1.3e+01	6.6e+01	9.1e+01	5.0e+00	5.8e-01	2.6e+00	1.3e+01	1.8e+01
Cf-250	1.4e+01	1.6e+00	7.1e+00	3.6e+01	4.9e+01	2.7e+00	3.1e-01	1.4e+00	7.0e+00	9.8e+00
Cf-251	2.6e+01	3.0e+00	1.3e+01	6.8e+01	9.2e+01	5.1e+00	5.9e-01	2.6e+00	1.3e+01	1.8e+01
Cf-252	1.0e+01	1.2e+00	5.4e+00	2.7e+01	3.7e+01	2.0e+00	2.4e-01	1.1e+00	5.3e+00	7.4e+00
Cf-254	1.7e+01	2.0e+00	9.1e+00	4.6e+01	6.2e+01	3.4e+00	4.0e-01	1.8e+00	9.0e+00	1.2e+01
Es-254	2.7e+00	3.1e-01	1.4e+00	7.0e+00	9.6e+00	5.3e-01	6.1e-02	2.7e-01	1.4e+00	1.9e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.4 Normalized effective dose equivalents from ingestion: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	3.0e-05	1.1e-06	1.3e-05	8.2e-05	1.2e-04	5.9e-06	2.1e-07	2.6e-06	1.6e-05	2.4e-05
C-14	9.7e-04	3.4e-05	4.4e-04	2.7e-03	4.0e-03	1.9e-04	6.8e-06	8.6e-05	5.3e-04	7.9e-04
Na-22	5.3e-03	1.9e-04	2.4e-03	1.5e-02	2.2e-02	1.1e-03	3.7e-05	4.7e-04	2.9e-03	4.3e-03
P-32	2.6e-03	8.6e-05	1.1e-03	7.0e-03	1.0e-02	5.1e-04	1.7e-05	2.2e-04	1.4e-03	2.1e-03
S-35	1.9e-04	6.8e-06	8.7e-05	5.4e-04	7.9e-04	3.8e-05	1.3e-06	1.7e-05	1.1e-04	1.6e-04
Cl-36	1.4e-03	5.0e-05	6.3e-04	3.9e-03	5.8e-03	2.8e-04	9.9e-06	1.3e-04	7.7e-04	1.2e-03
K-40	8.7e-03	3.1e-04	3.9e-03	2.4e-02	3.5e-02	1.7e-03	6.1e-05	7.7e-04	4.7e-03	7.1e-03
Ca-41	5.9e-04	2.1e-05	2.7e-04	1.6e-03	2.4e-03	1.2e-04	4.2e-06	5.3e-05	3.2e-04	4.8e-04
Ca-45	1.4e-03	5.0e-05	6.4e-04	3.9e-03	5.8e-03	2.8e-04	9.9e-06	1.3e-04	7.7e-04	1.2e-03
Sc-46	2.8e-03	9.7e-05	1.2e-03	7.6e-03	1.1e-02	5.5e-04	1.9e-05	2.4e-04	1.5e-03	2.2e-03
Cr-51	5.3e-05	1.9e-06	2.4e-05	1.5e-04	2.2e-04	1.1e-05	3.8e-07	4.7e-06	2.9e-05	4.3e-05
Mn-53	5.0e-05	1.8e-06	2.3e-05	1.4e-04	2.1e-04	1.0e-05	3.5e-07	4.5e-06	2.7e-05	4.1e-05
Mn-54	1.3e-03	4.5e-05	5.7e-04	3.5e-03	5.2e-03	2.5e-04	8.8e-06	1.1e-04	6.8e-04	1.0e-03
Fe-55	2.8e-04	9.9e-06	1.3e-04	7.8e-04	1.2e-03	5.6e-05	2.0e-06	2.5e-05	1.5e-04	2.3e-04
Fe-59	2.7e-03	9.3e-05	1.2e-03	7.4e-03	1.1e-02	5.3e-04	1.9e-05	2.4e-04	1.5e-03	2.2e-03
Co-56	4.3e-03	1.5e-04	1.9e-03	1.2e-02	1.8e-02	8.6e-04	3.0e-05	3.8e-04	2.4e-03	3.5e-03
Co-57	3.4e-04	1.2e-05	1.5e-04	9.3e-04	1.4e-03	6.7e-05	2.4e-06	3.0e-05	1.8e-04	2.8e-04
Co-58	1.3e-03	4.5e-05	5.7e-04	3.5e-03	5.1e-03	2.5e-04	8.9e-06	1.1e-04	6.9e-04	1.0e-03
Co-60	4.8e-03	1.7e-04	2.1e-03	1.3e-02	1.9e-02	9.4e-04	3.3e-05	4.2e-04	2.6e-03	3.9e-03
Ni-59	9.8e-05	3.5e-06	4.4e-05	2.7e-04	4.0e-04	1.9e-05	6.8e-07	8.7e-06	5.3e-05	8.0e-05
Ni-63	2.7e-04	9.5e-06	1.2e-04	7.4e-04	1.1e-03	5.3e-05	1.9e-06	2.4e-05	1.5e-04	2.2e-04
Zn-65	6.6e-03	2.3e-04	3.0e-03	1.8e-02	2.7e-02	1.3e-03	4.6e-05	5.8e-04	3.5e-03	5.3e-03
As-73	3.0e-04	1.1e-05	1.4e-04	8.4e-04	1.2e-03	6.0e-05	2.1e-06	2.7e-05	1.6e-04	2.5e-04
Se-75	4.2e-03	1.5e-04	1.9e-03	1.2e-02	1.7e-02	8.4e-04	3.0e-05	3.8e-04	2.3e-03	3.5e-03
Sr-85	8.3e-04	2.9e-05	3.7e-04	2.3e-03	3.4e-03	1.6e-04	5.8e-06	7.3e-05	4.5e-04	6.7e-04
Sr-89	3.8e-03	1.3e-04	1.7e-03	1.0e-02	1.5e-02	7.5e-04	2.6e-05	3.3e-04	2.1e-03	3.0e-03
Sr-90	7.2e-02	2.5e-03	3.2e-02	2.0e-01	2.9e-01	1.4e-02	5.0e-04	6.3e-03	3.9e-02	5.8e-02
Y-91	4.0e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02	7.8e-04	2.8e-05	3.5e-04	2.2e-03	3.2e-03
Zr-93	7.7e-04	2.7e-05	3.5e-04	2.1e-03	3.2e-03	1.5e-04	5.4e-06	6.9e-05	4.2e-04	6.3e-04
Zr-95	1.6e-03	6.3e-05	8.1e-04	4.9e-03	7.3e-03	3.6e-04	1.3e-05	1.6e-04	9.7e-04	1.5e-03
Nb-93m	2.4e-04	8.6e-06	1.1e-04	6.7e-04	9.9e-04	4.8e-05	1.7e-06	2.2e-05	1.3e-04	2.0e-04
Nb-94	3.3e-03	1.2e-04	1.5e-03	9.2e-03	1.4e-02	6.6e-04	2.3e-05	3.0e-04	1.8e-03	2.7e-03
Nb-95	9.9e-04	3.4e-05	4.4e-04	2.7e-03	4.0e-03	2.0e-04	6.9e-06	8.7e-05	5.4e-04	7.9e-04
Mo-93	6.3e-04	2.2e-05	2.8e-04	1.7e-03	2.6e-03	1.2e-04	4.4e-06	5.6e-05	3.4e-04	5.1e-04
Tc-97	8.0e-05	2.8e-06	3.6e-05	2.2e-04	3.3e-04	1.6e-05	5.6e-07	7.1e-06	4.3e-05	6.5e-05
Tc-97m	5.4e-04	1.9e-05	2.4e-04	1.5e-03	2.2e-03	1.1e-04	3.7e-06	4.7e-05	2.9e-04	4.4e-04
Tc-99	6.8e-04	2.4e-05	3.1e-04	1.9e-03	2.8e-03	1.4e-04	4.8e-06	6.0e-05	3.7e-04	5.6e-04
Ru-103	1.2e-03	4.2e-05	5.4e-04	3.3e-03	4.8e-03	2.4e-04	8.4e-06	1.1e-04	6.6e-04	9.7e-04
Ru-106	1.3e-02	4.4e-04	5.7e-03	3.5e-02	5.1e-02	2.5e-03	8.8e-05	1.1e-03	6.8e-03	1.0e-02
Ag-108m	3.6e-03	1.3e-04	1.6e-03	9.8e-03	1.5e-02	7.0e-04	2.5e-05	3.2e-04	1.9e-03	2.9e-03
Ag-110m	4.9e-03	1.7e-04	2.2e-03	1.4e-02	2.0e-02	9.7e-04	3.4e-05	4.3e-04	2.7e-03	4.0e-03
Cd-109	6.0e-03	2.1e-04	2.7e-03	1.7e-02	2.5e-02	1.2e-03	4.2e-05	5.4e-04	3.3e-03	4.9e-03
Sn-113	1.4e-03	4.9e-05	6.3e-04	3.9e-03	5.7e-03	2.8e-04	9.8e-06	1.2e-04	7.6e-04	1.1e-03
Sb-124	4.2e-03	1.5e-04	1.9e-03	1.2e-02	1.7e-02	8.4e-04	3.0e-05	3.7e-04	2.3e-03	3.4e-03
Sb-125	1.7e-03	6.0e-05	7.6e-04	4.6e-03	6.9e-03	3.3e-04	1.2e-05	1.5e-04	9.1e-04	1.4e-03
Te-123m	2.5e-03	8.8e-05	1.1e-03	6.9e-03	1.0e-02	4.9e-04	1.7e-05	2.2e-04	1.4e-03	2.0e-03
Te-127m	3.9e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02	7.8e-04	2.7e-05	3.5e-04	2.1e-03	3.2e-03
I-125	1.6e-02	5.7e-04	7.2e-03	4.4e-02	6.5e-02	3.2e-03	1.1e-04	1.4e-03	8.8e-03	1.3e-02
I-129	1.3e-01	4.5e-03	5.8e-02	3.6e-01	5.3e-01	2.6e-02	9.0e-04	1.1e-02	7.0e-02	1.1e-01
I-131	1.1e-02	3.6e-04	4.7e-03	3.0e-02	4.7e-02	2.2e-03	7.0e-05	9.2e-04	5.9e-03	9.2e-03
Cs-134	3.4e-02	1.2e-03	1.5e-02	9.3e-02	1.4e-01	6.7e-03	2.4e-04	3.0e-03	1.8e-02	2.8e-02
Cs-135	3.3e-03	1.2e-04	1.5e-03	9.1e-03	1.3e-02	6.5e-04	2.3e-05	2.9e-04	1.8e-03	2.7e-03
Cs-137	2.3e-02	8.2e-04	1.0e-02	6.4e-02	9.5e-02	4.6e-03	1.6e-04	2.1e-03	1.3e-02	1.9e-02
Ba-133	1.6e-03	5.6e-05	7.1e-04	4.4e-03	6.5e-03	3.1e-04	1.1e-05	1.4e-04	8.6e-04	1.3e-03
Ce-139	5.1e-04	1.8e-05	2.3e-04	1.4e-03	2.1e-03	1.0e-04	3.5e-06	4.5e-05	2.8e-04	4.1e-04
Ce-141	1.1e-03	3.8e-05	4.9e-04	3.1e-03	4.4e-03	2.2e-04	7.7e-06	9.7e-05	6.0e-04	8.8e-04
Ce-144	9.6e-03	3.4e-04	4.3e-03	2.7e-02	3.9e-02	1.9e-03	6.7e-05	8.5e-04	5.2e-03	7.8e-03
Pm-147	4.9e-04	1.7e-05	2.2e-04	1.3e-03	2.0e-03	9.6e-05	3.4e-06	4.3e-05	2.6e-04	4.0e-04

Table F1.4 Normalized effective dose equivalents from ingestion: Scrap yard

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.8e-04	6.4e-06	8.1e-05	5.0e-04	7.4e-04	3.6e-05	1.3e-06	1.6e-05	9.8e-05	1.5e-04
Eu-152	3.0e-03	1.1e-04	1.4e-03	8.3e-03	1.2e-02	6.0e-04	2.1e-05	2.7e-04	1.6e-03	2.5e-03
Eu-154	4.4e-03	1.6e-04	2.0e-03	1.2e-02	1.8e-02	8.8e-04	3.1e-05	3.9e-04	2.4e-03	3.6e-03
Eu-155	7.1e-04	2.5e-05	3.2e-04	2.0e-03	2.9e-03	1.4e-04	5.0e-06	6.3e-05	3.9e-04	5.8e-04
Gd-153	5.3e-04	1.9e-05	2.4e-04	1.5e-03	2.2e-03	1.1e-04	3.7e-06	4.7e-05	2.9e-04	4.3e-04
Tb-160	2.9e-03	1.0e-04	1.3e-03	7.9e-03	1.2e-02	5.7e-04	2.0e-05	2.5e-04	1.6e-03	2.3e-03
Tm-170	2.3e-03	8.3e-05	1.1e-03	6.5e-03	9.5e-03	4.6e-04	1.6e-05	2.1e-04	1.3e-03	1.9e-03
Tm-171	2.0e-04	7.0e-06	8.9e-05	5.5e-04	8.1e-04	3.9e-05	1.4e-06	1.8e-05	1.1e-04	1.6e-04
Ta-182	2.9e-03	1.0e-04	1.3e-03	7.9e-03	1.2e-02	5.7e-04	2.0e-05	2.5e-04	1.6e-03	2.3e-03
W-181	1.3e-04	4.5e-06	5.7e-05	3.5e-04	5.1e-04	2.5e-05	8.8e-07	1.1e-05	6.9e-05	1.0e-04
W-185	6.8e-04	2.4e-05	3.0e-04	1.9e-03	2.7e-03	1.3e-04	4.7e-06	6.0e-05	3.7e-04	5.5e-04
Os-185	9.8e-04	3.5e-05	4.4e-04	2.7e-03	4.0e-03	1.9e-04	6.8e-06	8.7e-05	5.3e-04	8.0e-04
Ir-192	2.4e-03	8.6e-05	1.1e-03	6.8e-03	9.9e-03	4.8e-04	1.7e-05	2.2e-04	1.3e-03	2.0e-03
Tl-204	1.6e-03	5.5e-05	7.0e-04	4.3e-03	6.4e-03	3.1e-04	1.1e-05	1.4e-04	8.4e-04	1.3e-03
Pb-210	3.4e+00	1.2e-01	1.5e+00	9.3e+00	1.4e+01	6.7e-01	2.4e-02	3.0e-01	1.8e+00	2.8e+00
Bi-207	2.6e-03	9.0e-05	1.1e-03	7.0e-03	1.0e-02	5.1e-04	1.8e-05	2.3e-04	1.4e-03	2.1e-03
Po-210	8.5e-01	3.0e-02	3.8e-01	2.3e+00	3.4e+00	1.7e-01	5.9e-03	7.5e-02	4.6e-01	6.9e-01
Ra-226	6.2e-01	2.2e-02	2.8e-01	1.7e+00	2.5e+00	1.2e-01	4.3e-03	5.5e-02	3.4e-01	5.1e-01
Ra-228	6.7e-01	2.4e-02	3.0e-01	1.9e+00	2.7e+00	1.3e-01	4.7e-03	6.0e-02	3.6e-01	5.5e-01
Ac-227	6.9e+00	2.4e-01	3.1e+00	1.9e+01	2.8e+01	1.4e+00	4.8e-02	6.1e-01	3.7e+00	5.6e+00
Th-228	3.7e-01	1.3e-02	1.7e-01	1.0e+00	1.5e+00	7.4e-02	2.6e-03	3.3e-02	2.0e-01	3.0e-01
Th-229	1.9e+00	6.6e-02	8.4e-01	5.2e+00	7.7e+00	3.7e-01	1.3e-02	1.7e-01	1.0e+00	1.5e+00
Th-230	2.6e-01	9.0e-03	1.1e-01	7.0e-01	1.0e+00	5.1e-02	1.8e-03	2.3e-02	1.4e-01	2.1e-01
Th-232	1.3e+00	4.5e-02	5.7e-01	3.5e+00	5.2e+00	2.5e-01	8.9e-03	1.1e-01	6.9e-01	1.0e+00
Pa-231	4.9e+00	1.7e-01	2.2e+00	1.4e+01	2.0e+01	9.8e-01	3.5e-02	4.4e-01	2.7e+00	4.0e+00
U-232	6.2e-01	2.2e-02	2.8e-01	1.7e+00	2.5e+00	1.2e-01	4.3e-03	5.4e-02	3.3e-01	5.0e-01
U-233	1.3e-01	4.8e-03	6.1e-02	3.7e-01	5.5e-01	2.7e-02	9.4e-04	1.2e-02	7.3e-02	1.1e-01
U-234	1.3e-01	4.7e-03	5.9e-02	3.6e-01	5.4e-01	2.6e-02	9.2e-04	1.2e-02	7.2e-02	1.1e-01
U-235	1.2e-01	4.4e-03	5.6e-02	3.4e-01	5.1e-01	2.5e-02	8.7e-04	1.1e-02	6.8e-02	1.0e-01
U-236	1.3e-01	4.4e-03	5.6e-02	3.5e-01	5.1e-01	2.5e-02	8.8e-04	1.1e-02	6.8e-02	1.0e-01
U-238	1.3e-01	4.4e-03	5.6e-02	3.4e-01	5.1e-01	2.5e-02	8.8e-04	1.1e-02	6.8e-02	1.0e-01
Np-237	2.1e+00	7.3e-02	9.3e-01	5.7e+00	8.5e+00	4.1e-01	1.5e-02	1.8e-01	1.1e+00	1.7e+00
Pu-236	5.4e-01	1.9e-02	2.4e-01	1.5e+00	2.2e+00	1.1e-01	3.8e-03	4.8e-02	2.9e-01	4.4e-01
Pu-238	1.5e+00	5.3e-02	6.7e-01	4.1e+00	6.1e+00	3.0e-01	1.0e-02	1.3e-01	8.1e-01	1.2e+00
Pu-239	1.7e+00	5.8e-02	7.4e-01	4.5e+00	6.7e+00	3.3e-01	1.2e-02	1.5e-01	9.0e-01	1.3e+00
Pu-240	1.7e+00	5.8e-02	7.4e-01	4.5e+00	6.7e+00	3.3e-01	1.2e-02	1.5e-01	9.0e-01	1.3e+00
Pu-241	3.2e-02	1.1e-03	1.4e-02	8.8e-02	1.3e-01	6.3e-03	2.2e-04	2.8e-03	1.7e-02	2.6e-02
Pu-242	1.6e+00	5.5e-02	7.0e-01	4.3e+00	6.4e+00	3.1e-01	1.1e-02	1.4e-01	8.5e-01	1.3e+00
Pu-244	1.6e+00	5.5e-02	7.0e-01	4.3e+00	6.3e+00	3.1e-01	1.1e-02	1.4e-01	8.4e-01	1.3e+00
Am-241	1.7e+00	6.0e-02	7.6e-01	4.7e+00	6.9e+00	3.4e-01	1.2e-02	1.5e-01	9.2e-01	1.4e+00
Am-242m	1.7e+00	6.0e-02	7.6e-01	4.6e+00	6.9e+00	3.3e-01	1.2e-02	1.5e-01	9.1e-01	1.4e+00
Am-243	1.7e+00	6.0e-02	7.6e-01	4.7e+00	6.9e+00	3.4e-01	1.2e-02	1.5e-01	9.2e-01	1.4e+00
Cm-242	5.2e-02	1.8e-03	2.3e-02	1.4e-01	2.1e-01	1.0e-02	3.6e-04	4.6e-03	2.8e-02	4.2e-02
Cm-243	1.2e+00	4.1e-02	5.3e-01	3.2e+00	4.8e+00	2.3e-01	8.2e-03	1.0e-01	6.4e-01	9.6e-01
Cm-244	9.4e-01	3.3e-02	4.2e-01	2.6e+00	3.8e+00	1.9e-01	6.6e-03	8.3e-02	5.1e-01	7.7e-01
Cm-245	1.7e+00	6.2e-02	7.8e-01	4.8e+00	7.1e+00	3.5e-01	1.2e-02	1.5e-01	9.5e-01	1.4e+00
Cm-246	1.7e+00	6.1e-02	7.8e-01	4.8e+00	7.0e+00	3.4e-01	1.2e-02	1.5e-01	9.4e-01	1.4e+00
Cm-247	1.6e+00	5.6e-02	7.2e-01	4.4e+00	6.5e+00	3.2e-01	1.1e-02	1.4e-01	8.7e-01	1.3e+00
Cm-248	6.4e+00	2.2e-01	2.9e+00	1.8e+01	2.6e+01	1.3e+00	4.4e-02	5.6e-01	3.4e+00	5.2e+00
Bk-249	5.6e-03	2.0e-04	2.5e-03	1.5e-02	2.3e-02	1.1e-03	3.9e-05	5.0e-04	3.0e-03	4.6e-03
Cf-248	1.5e-01	5.4e-03	6.9e-02	4.2e-01	6.3e-01	3.0e-02	1.1e-03	1.4e-02	8.3e-02	1.3e-01
Cf-249	2.2e+00	7.8e-02	9.9e-01	6.1e+00	9.0e+00	4.4e-01	1.5e-02	2.0e-01	1.2e+00	1.8e+00
Cf-250	9.9e-01	3.5e-02	4.5e-01	2.7e+00	4.1e+00	2.0e-01	6.9e-03	8.8e-02	5.4e-01	8.1e-01
Cf-251	2.3e+00	8.0e-02	1.0e+00	6.2e+00	9.2e+00	4.5e-01	1.6e-02	2.0e-01	1.2e+00	1.8e+00
Cf-252	5.0e-01	1.8e-02	2.3e-01	1.4e+00	2.1e+00	1.0e-01	3.5e-03	4.5e-02	2.7e-01	4.1e-01
Cf-254	1.0e+00	3.6e-02	4.5e-01	2.8e+00	4.1e+00	2.0e-01	7.1e-03	8.9e-02	5.5e-01	8.2e-01
Es-254	1.4e-01	5.1e-03	6.5e-02	4.0e-01	5.9e-01	2.9e-02	1.0e-03	1.3e-02	7.8e-02	1.2e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.5 Normalized effective dose equivalents from all pathways: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.0e+01	1.3e+00	5.9e+00	2.0e+01	3.1e+01	2.0e+00	2.6e-01	1.2e+00	3.9e+00	6.1e+00
P-32	4.1e-03	4.1e-04	2.0e-03	8.5e-03	1.4e-02	8.0e-04	8.2e-05	3.9e-04	1.7e-03	2.7e-03
S-35	3.0e-04	3.7e-05	1.7e-04	5.9e-04	9.0e-04	5.9e-05	7.4e-06	3.3e-05	1.2e-04	1.9e-04
Cl-36	1.7e-03	1.5e-04	8.9e-04	3.5e-03	5.5e-03	3.3e-04	3.0e-05	1.8e-04	6.9e-04	1.1e-03
K-40	8.2e-01	1.0e-01	4.7e-01	1.6e+00	2.4e+00	1.6e-01	2.0e-02	9.2e-02	3.1e-01	4.9e-01
Ca-41	5.8e-04	5.4e-05	3.1e-04	1.2e-03	1.8e-03	1.1e-04	1.1e-05	6.1e-05	2.3e-04	3.6e-04
Ca-45	1.6e-03	1.9e-04	9.1e-04	3.3e-03	5.1e-03	3.2e-04	3.7e-05	1.8e-04	6.3e-04	9.9e-04
Sc-46	1.4e+01	1.9e+00	8.1e+00	2.8e+01	4.4e+01	2.6e+00	3.8e-01	1.6e+00	5.5e+00	8.5e+00
Cr-51	4.2e-02	3.2e-03	2.1e-02	8.8e-02	1.4e-01	8.2e-03	6.5e-04	4.1e-03	1.8e-02	2.7e-02
Mn-53	8.1e-05	9.3e-06	4.5e-05	1.6e-04	2.5e-04	1.6e-05	1.9e-06	9.0e-06	3.2e-05	4.9e-05
Mn-54	6.4e+00	8.0e-01	3.7e+00	1.2e+01	1.9e+01	1.3e+00	1.6e-01	7.3e-01	2.5e+00	3.8e+00
Fe-55	9.2e-06	7.3e-07	4.8e-06	1.9e-05	3.0e-05	1.8e-06	1.5e-07	9.5e-07	3.7e-06	5.9e-06
Fe-59	1.9e-01	1.8e-02	1.0e-01	3.8e-01	6.0e-01	3.7e-02	3.6e-03	2.0e-02	7.5e-02	1.2e-01
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.1e+00	4.1e-01	1.8e+00	6.1e+00	9.6e+00	6.1e-01	8.2e-02	3.5e-01	1.2e+00	1.9e+00
Sr-89	1.1e-02	1.5e-03	8.4e-03	2.2e-02	3.5e-02	2.2e-03	3.0e-04	1.3e-03	4.3e-03	6.8e-03
Sr-90	1.1e-01	1.4e-02	6.5e-02	2.2e-01	3.5e-01	2.2e-02	2.8e-03	1.3e-02	4.4e-02	6.9e-02
Y-91	3.9e-02	5.3e-03	2.2e-02	7.6e-02	1.2e-01	7.6e-03	1.1e-03	4.3e-03	1.5e-02	2.3e-02
Zr-93	9.2e-03	1.1e-03	5.1e-03	1.9e-02	2.8e-02	1.8e-03	2.2e-04	1.0e-03	3.7e-03	5.5e-03
Zr-95	7.3e+00	9.3e-01	4.2e+00	1.4e+01	2.2e+01	1.4e+00	1.8e-01	8.2e-01	2.8e+00	4.3e+00
Nb-93m	3.3e-03	4.1e-04	1.9e-03	6.8e-03	1.0e-02	6.6e-04	8.2e-05	3.7e-04	1.3e-03	2.0e-03
Nb-94	1.4e+01	1.8e+00	8.2e+00	2.8e+01	4.3e+01	2.8e+00	3.6e-01	1.6e+00	5.5e+00	8.6e+00
Nb-95	3.7e+00	4.9e-01	2.1e+00	7.4e+00	1.2e+01	7.3e-01	9.8e-02	4.1e-01	1.5e+00	2.3e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.7e-01	3.0e-02	1.9e-01	7.6e-01	1.2e+00	7.2e-02	6.1e-03	3.7e-02	1.5e-01	2.4e-01
Sb-125	1.1e-01	8.5e-03	5.6e-02	2.3e-01	3.5e-01	2.1e-02	1.7e-03	1.1e-02	4.5e-02	7.0e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	6.9e-03	5.9e-04	3.5e-03	1.4e-02	2.3e-02	1.4e-03	1.2e-04	6.9e-04	2.8e-03	4.4e-03
I-129	3.3e-02	2.2e-03	1.6e-02	6.8e-02	1.1e-01	6.4e-03	4.5e-04	3.1e-03	1.3e-02	2.1e-02
I-131	8.4e-02	2.9e-03	2.6e-02	1.9e-01	3.3e-01	1.6e-02	5.6e-04	5.2e-03	3.7e-02	6.4e-02
Cs-134	3.4e-01	3.1e-02	1.7e-01	7.0e-01	1.1e+00	6.6e-02	6.1e-03	3.4e-02	1.4e-01	2.1e-01
Cs-135	7.3e-05	4.7e-06	3.5e-05	1.6e-04	2.4e-04	1.4e-05	9.5e-07	6.9e-06	3.1e-05	4.8e-05
Cs-137	1.2e-01	1.1e-02	6.5e-02	2.6e-01	4.0e-01	2.4e-02	2.3e-03	1.3e-02	5.2e-02	7.9e-02
Ba-133	2.9e+00	3.7e-01	1.7e+00	5.6e+00	8.8e+00	5.7e-01	7.3e-02	3.3e-01	1.1e+00	1.7e+00
Ce-139	8.0e-01	1.0e-01	4.5e-01	1.6e+00	2.4e+00	1.6e-01	2.1e-02	9.0e-02	3.1e-01	4.7e-01
Ce-141	2.4e-01	3.2e-02	1.3e-01	4.8e-01	7.7e-01	4.8e-02	6.3e-03	2.6e-02	9.6e-02	1.5e-01
Ce-144	4.8e-01	6.3e-02	2.7e-01	9.3e-01	1.5e+00	9.4e-02	1.3e-02	5.4e-02	1.8e-01	2.8e-01
Pm-147	4.4e-03	5.3e-04	2.4e-03	8.9e-03	1.3e-02	8.6e-04	1.1e-04	4.8e-04	1.7e-03	2.6e-03

Table F1.5 Normalized effective dose equivalents from all pathways: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.2e-03	3.9e-04	1.8e-03	6.5e-03	9.8e-03	6.4e-04	7.8e-05	3.5e-04	1.3e-03	2.0e-03
Eu-152	1.0e+01	1.3e+00	5.9e+00	2.0e+01	3.1e+01	2.0e+00	2.6e-01	1.2e+00	4.0e+00	6.2e+00
Eu-154	1.1e+01	1.4e+00	6.4e+00	2.2e+01	3.4e+01	2.2e+00	2.8e-01	1.3e+00	4.3e+00	6.7e+00
Eu-155	2.7e-01	3.4e-02	1.5e-01	5.2e-01	8.1e-01	5.3e-02	6.8e-03	3.0e-02	1.0e-01	1.6e-01
Gd-153	3.3e-01	4.2e-02	1.9e-01	6.4e-01	1.0e+00	6.5e-02	8.5e-03	3.7e-02	1.3e-01	2.0e-01
Tb-160	7.5e+00	9.9e-01	4.2e+00	1.5e+01	2.3e+01	1.5e+00	2.0e-01	8.4e-01	2.9e+00	4.5e+00
Tm-170	2.2e-02	3.0e-03	1.3e-02	4.3e-02	6.7e-02	4.4e-03	6.0e-04	2.5e-03	8.5e-03	1.3e-02
Tm-171	2.7e-03	3.6e-04	1.5e-03	5.1e-03	8.0e-03	5.2e-04	7.0e-05	3.0e-04	1.0e-03	1.6e-03
Ta-182	9.7e+00	1.3e+00	5.5e+00	1.9e+01	2.9e+01	1.9e+00	2.5e-01	1.1e+00	3.7e+00	5.7e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.8e+01	2.3e+00	1.0e+01	3.4e+01	5.4e+01	3.5e+00	4.6e-01	2.0e+00	6.8e+00	1.1e+01
Ra-228	1.1e+01	1.4e+00	6.5e+00	2.2e+01	3.4e+01	2.2e+00	2.8e-01	1.3e+00	4.3e+00	6.6e+00
Ac-227	1.4e+02	1.7e+01	8.0e+01	2.8e+02	4.4e+02	2.8e+01	3.5e+00	1.6e+01	5.7e+01	8.6e+01
Th-228	4.9e+01	6.4e+00	2.8e+01	9.8e+01	1.5e+02	9.7e+00	1.3e+00	5.6e+00	1.9e+01	2.9e+01
Th-229	1.8e+02	2.2e+01	1.0e+02	3.7e+02	5.6e+02	3.6e+01	4.4e+00	2.0e+01	7.4e+01	1.1e+02
Th-230	2.7e+01	3.2e+00	1.5e+01	5.5e+01	8.4e+01	5.4e+00	6.5e-01	3.0e+00	1.1e+01	1.6e+01
Th-232	1.2e+02	1.4e+01	6.7e+01	2.4e+02	3.7e+02	2.4e+01	2.9e+00	1.3e+01	4.8e+01	7.2e+01
Pa-231	9.3e+01	1.1e+01	5.2e+01	1.9e+02	2.8e+02	1.8e+01	2.2e+00	1.0e+01	3.7e+01	5.6e+01
U-232	7.0e+01	8.3e+00	3.9e+01	1.4e+02	2.1e+02	1.4e+01	1.7e+00	7.6e+00	2.8e+01	4.2e+01
U-233	1.4e+01	1.7e+00	7.8e+00	2.8e+01	4.3e+01	2.8e+00	3.4e-01	1.5e+00	5.5e+00	8.4e+00
U-234	1.4e+01	1.6e+00	7.6e+00	2.8e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.5e+00	8.3e+00
U-235	1.4e+01	1.7e+00	7.7e+00	2.8e+01	4.2e+01	2.7e+00	3.4e-01	1.5e+00	5.5e+00	8.2e+00
U-236	1.3e+01	1.6e+00	7.2e+00	2.6e+01	4.0e+01	2.6e+00	3.1e-01	1.4e+00	5.2e+00	7.8e+00
U-238	1.2e+01	1.5e+00	6.9e+00	2.5e+01	3.8e+01	2.5e+00	3.0e-01	1.4e+00	5.0e+00	7.5e+00
Np-237	5.9e+01	7.1e+00	3.3e+01	1.2e+02	1.8e+02	1.2e+01	1.4e+00	6.5e+00	2.3e+01	3.5e+01
Pu-236	1.4e+01	1.6e+00	7.5e+00	2.7e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.4e+00	8.2e+00
Pu-238	3.1e+01	3.7e+00	1.7e+01	6.3e+01	9.5e+01	6.1e+00	7.5e-01	3.4e+00	1.2e+01	1.9e+01
Pu-239	3.3e+01	4.0e+00	1.8e+01	6.7e+01	1.0e+02	6.5e+00	8.0e-01	3.6e+00	1.3e+01	2.0e+01
Pu-240	3.3e+01	4.0e+00	1.8e+01	6.7e+01	1.0e+02	6.5e+00	8.0e-01	3.6e+00	1.3e+01	2.0e+01
Pu-241	5.4e-01	6.5e-02	3.0e-01	1.1e+00	1.7e+00	1.1e-01	1.3e-02	5.9e-02	2.2e-01	3.2e-01
Pu-242	3.2e+01	3.8e+00	1.7e+01	6.4e+01	9.7e+01	6.2e+00	7.6e-01	3.4e+00	1.3e+01	1.9e+01
Pu-244	3.4e+01	4.2e+00	1.9e+01	6.9e+01	1.0e+02	6.7e+00	8.4e-01	3.8e+00	1.3e+01	2.0e+01
Am-241	4.7e+01	5.7e+00	2.6e+01	9.6e+01	1.4e+02	9.3e+00	1.1e+00	5.2e+00	1.9e+01	2.8e+01
Am-242m	4.7e+01	5.6e+00	2.6e+01	9.5e+01	1.4e+02	9.2e+00	1.1e+00	5.1e+00	1.9e+01	2.8e+01
Am-243	4.8e+01	5.8e+00	2.7e+01	9.8e+01	1.5e+02	9.5e+00	1.2e+00	5.3e+00	1.9e+01	2.9e+01
Cm-242	1.6e+00	2.0e-01	8.9e-01	3.2e+00	4.9e+00	3.2e-01	4.0e-02	1.8e-01	6.4e-01	9.7e-01
Cm-243	3.3e+01	4.0e+00	1.9e+01	6.8e+01	1.0e+02	6.6e+00	8.1e-01	3.7e+00	1.3e+01	2.0e+01
Cm-244	2.6e+01	3.1e+00	1.5e+01	5.3e+01	8.1e+01	5.2e+00	6.3e-01	2.9e+00	1.0e+01	1.6e+01
Cm-245	4.9e+01	5.9e+00	2.7e+01	9.9e+01	1.5e+02	9.6e+00	1.2e+00	5.4e+00	1.9e+01	2.9e+01
Cm-246	4.8e+01	5.7e+00	2.7e+01	9.7e+01	1.5e+02	9.4e+00	1.2e+00	5.3e+00	1.9e+01	2.9e+01
Cm-247	4.7e+01	5.7e+00	2.6e+01	9.5e+01	1.4e+02	9.2e+00	1.1e+00	5.2e+00	1.9e+01	2.8e+01
Cm-248	1.8e+02	2.1e+01	9.7e+01	3.6e+02	5.4e+02	3.5e+01	4.2e+00	1.9e+01	7.0e+01	1.1e+02
Bk-249	1.5e-01	1.7e-02	8.0e-02	2.9e-01	4.4e-01	2.9e-02	3.5e-03	1.6e-02	5.8e-02	8.7e-02
Cf-248	5.1e+00	6.2e-01	2.8e+00	1.0e+01	1.6e+01	1.0e+00	1.2e-01	5.6e-01	2.0e+00	3.1e+00
Cf-249	4.4e+01	5.4e+00	2.4e+01	8.8e+01	1.3e+02	8.6e+00	1.1e+00	4.8e+00	1.7e+01	2.6e+01
Cf-250	2.2e+01	2.6e+00	1.2e+01	4.4e+01	6.6e+01	4.3e+00	5.3e-01	2.4e+00	8.8e+00	1.3e+01
Cf-251	4.3e+01	5.2e+00	2.4e+01	8.6e+01	1.3e+02	8.4e+00	1.0e+00	4.7e+00	1.7e+01	2.6e+01
Cf-252	1.6e+01	2.0e+00	9.0e+00	3.3e+01	4.9e+01	3.2e+00	3.9e-01	1.8e+00	6.5e+00	9.8e+00
Cf-254	2.2e+01	2.8e+00	1.2e+01	4.3e+01	6.7e+01	4.3e+00	5.6e-01	2.4e+00	8.5e+00	1.3e+01
Es-254	1.2e+01	1.6e+00	6.1e+00	2.3e+01	3.5e+01	2.3e+00	3.1e-01	1.3e+00	4.5e+00	6.9e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.6 Normalized effective dose equivalents from external exposure: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.0e+01	1.3e+00	5.9e+00	2.0e+01	3.1e+01	2.0e+00	2.6e-01	1.2e+00	3.9e+00	6.1e+00
P-32	3.3e-03	3.4e-04	1.6e-03	7.1e-03	1.2e-02	6.6e-04	6.7e-05	3.2e-04	1.4e-03	2.2e-03
S-35	1.5e-05	1.9e-06	8.6e-06	3.0e-05	4.6e-05	3.0e-06	3.8e-07	1.7e-06	5.8e-06	9.1e-06
Cl-36	8.8e-04	7.3e-05	4.5e-04	1.8e-03	2.8e-03	1.7e-04	1.5e-05	8.9e-05	3.5e-04	5.5e-04
K-40	8.1e-01	1.0e-01	4.6e-01	1.6e+00	2.4e+00	1.6e-01	2.0e-02	9.1e-02	3.1e-01	4.9e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	8.0e-05	1.0e-05	4.6e-05	1.6e-04	2.4e-04	1.6e-05	2.1e-06	9.0e-06	3.1e-05	4.8e-05
Sc-46	1.4e+01	1.9e+00	8.1e+00	2.8e+01	4.4e+01	2.8e+00	3.8e-01	1.6e+00	5.5e+00	8.5e+00
Cr-51	4.2e-02	3.2e-03	2.1e-02	8.8e-02	1.4e-01	8.2e-03	6.4e-04	4.1e-03	1.8e-02	2.7e-02
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	6.4e+00	8.0e-01	3.7e+00	1.2e+01	1.9e+01	1.3e+00	1.6e-01	7.3e-01	2.5e+00	3.8e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.9e-01	1.8e-02	1.0e-01	3.8e-01	6.0e-01	3.7e-02	3.6e-03	2.0e-02	7.5e-02	1.2e-01
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.1e+00	4.1e-01	1.8e+00	6.1e+00	9.6e+00	6.1e-01	8.2e-02	3.5e-01	1.2e+00	1.9e+00
Sr-89	8.7e-03	1.1e-03	4.9e-03	1.7e-02	2.7e-02	1.7e-03	2.3e-04	9.6e-04	3.4e-03	5.2e-03
Sr-90	3.6e-02	4.6e-03	2.1e-02	7.0e-02	1.1e-01	7.1e-03	9.0e-04	4.1e-03	1.4e-02	2.2e-02
Y-91	3.3e-02	4.4e-03	1.9e-02	6.4e-02	1.0e-01	6.5e-03	8.7e-04	3.7e-03	1.3e-02	2.0e-02
Zr-93	5.6e-07	4.5e-08	2.9e-07	1.1e-06	1.8e-06	1.1e-07	9.1e-09	5.7e-08	2.2e-07	3.4e-07
Zr-95	7.3e+00	9.3e-01	4.2e+00	1.4e+01	2.2e+01	1.4e+00	1.8e-01	8.2e-01	2.8e+00	4.3e+00
Nb-93m	1.5e-04	1.9e-05	8.7e-05	3.0e-04	4.6e-04	3.0e-05	3.8e-06	1.7e-05	5.9e-05	9.1e-05
Nb-94	1.4e+01	1.8e+00	8.1e+00	2.8e+01	4.3e+01	2.8e+00	3.6e-01	1.6e+00	5.5e+00	8.5e+00
Nb-95	3.7e+00	4.9e-01	2.1e+00	7.4e+00	1.2e+01	7.3e-01	9.8e-02	4.1e-01	1.5e+00	2.3e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.7e-01	3.0e-02	1.9e-01	7.6e-01	1.2e+00	7.2e-02	6.1e-03	3.7e-02	1.5e-01	2.4e-01
Sb-125	1.1e-01	8.5e-03	5.6e-02	2.3e-01	3.5e-01	2.1e-02	1.7e-03	1.1e-02	4.5e-02	7.0e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.2e-03	3.6e-04	2.1e-03	8.6e-03	1.4e-02	8.3e-04	7.3e-05	4.2e-04	1.7e-03	2.7e-03
I-129	4.8e-03	3.9e-04	2.4e-03	9.7e-03	1.5e-02	9.4e-04	7.8e-05	4.8e-04	1.9e-03	3.0e-03
I-131	8.3e-02	2.9e-03	2.6e-02	1.9e-01	3.2e-01	1.6e-02	5.6e-04	5.2e-03	3.6e-02	6.4e-02
Cs-134	3.3e-01	3.1e-02	1.7e-01	7.0e-01	1.1e+00	6.6e-02	6.1e-03	3.4e-02	1.4e-01	2.1e-01
Cs-135	1.4e-06	1.3e-07	7.2e-07	2.9e-06	4.5e-06	2.7e-07	2.5e-08	1.4e-07	5.8e-07	8.9e-07
Cs-137	1.2e-01	1.1e-02	6.4e-02	2.6e-01	4.0e-01	2.4e-02	2.2e-03	1.3e-02	5.2e-02	7.9e-02
Ba-133	2.9e+00	3.6e-01	1.7e+00	5.6e+00	8.7e+00	5.7e-01	7.3e-02	3.3e-01	1.1e+00	1.7e+00
Ce-139	8.0e-01	1.0e-01	4.5e-01	1.6e+00	2.4e+00	1.6e-01	2.1e-02	9.0e-02	3.1e-01	4.7e-01
Ce-141	2.4e-01	3.2e-02	1.3e-01	4.8e-01	7.6e-01	4.8e-02	6.3e-03	2.6e-02	9.6e-02	1.5e-01
Ce-144	4.4e-01	5.6e-02	2.5e-01	8.4e-01	1.3e+00	8.6e-02	1.1e-02	4.9e-02	1.7e-01	2.6e-01
Pm-147	7.2e-05	9.1e-06	4.1e-05	1.4e-04	2.2e-04	1.4e-05	1.8e-06	8.1e-06	2.8e-05	4.3e-05

Table F1.6 Normalized effective dose equivalents from external exposure: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.5e-06	1.8e-07	8.2e-07	2.8e-06	4.4e-06	2.9e-07	3.6e-08	1.6e-07	5.6e-07	8.6e-07
Eu-152	1.0e+01	1.3e+00	5.8e+00	2.0e+01	3.1e+01	2.0e+00	2.6e-01	1.2e+00	3.9e+00	6.1e+00
Eu-154	1.1e+01	1.4e+00	6.4e+00	2.2e+01	3.4e+01	2.2e+00	2.8e-01	1.3e+00	4.3e+00	6.7e+00
Eu-155	2.7e-01	3.3e-02	1.5e-01	5.1e-01	8.0e-01	5.2e-02	6.7e-03	3.0e-02	1.0e-01	1.6e-01
Gd-153	3.3e-01	4.2e-02	1.9e-01	6.4e-01	1.0e+00	6.5e-02	8.4e-03	3.7e-02	1.3e-01	1.9e-01
Tb-160	7.5e+00	9.9e-01	4.2e+00	1.5e+01	2.3e+01	1.5e+00	2.0e-01	8.4e-01	2.9e+00	4.5e+00
Tm-170	1.9e-02	2.4e-03	1.1e-02	3.8e-02	5.6e-02	3.6e-03	4.8e-04	2.1e-03	7.1e-03	1.1e-02
Tm-171	1.6e-03	2.0e-04	9.1e-04	3.1e-03	4.8e-03	3.1e-04	4.0e-05	1.8e-04	6.1e-04	9.5e-04
Ta-182	9.6e+00	1.3e+00	5.5e+00	1.9e+01	2.9e+01	1.9e+00	2.5e-01	1.1e+00	3.7e+00	5.7e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.7e+01	2.1e+00	9.4e+00	3.2e+01	5.0e+01	3.2e+00	4.1e-01	1.8e+00	6.3e+00	9.8e+00
Ra-228	9.2e+00	1.1e+00	5.2e+00	1.8e+01	2.8e+01	1.8e+00	2.3e-01	1.0e+00	3.5e+00	5.5e+00
Ac-227	3.0e+00	3.7e-01	1.7e+00	5.7e+00	9.0e+00	5.8e-01	7.4e-02	3.3e-01	1.1e+00	1.8e+00
Th-228	1.5e+01	1.8e+00	8.3e+00	2.8e+01	4.4e+01	2.9e+00	3.7e-01	1.6e+00	5.6e+00	8.7e+00
Th-229	2.3e+00	2.9e-01	1.3e+00	4.5e+00	7.1e+00	4.5e-01	5.9e-02	2.6e-01	9.0e-01	1.4e+00
Th-230	2.4e-03	2.8e-04	1.4e-03	4.7e-03	7.3e-03	4.8e-04	5.6e-05	2.7e-04	9.3e-04	1.4e-03
Th-232	9.9e-02	7.8e-03	5.0e-02	2.0e-01	3.1e-01	1.9e-02	1.6e-03	9.9e-03	3.9e-02	6.0e-02
Pa-231	2.9e-01	3.6e-02	1.6e-01	5.6e-01	8.8e-01	5.7e-02	7.2e-03	3.2e-02	1.1e-01	1.7e-01
U-232	4.8e-01	3.9e-02	2.4e-01	9.7e-01	1.5e+00	9.5e-02	7.9e-03	4.9e-02	1.9e-01	3.0e-01
U-233	2.1e-03	2.6e-04	1.2e-03	4.0e-03	6.3e-03	4.1e-04	5.2e-05	2.3e-04	8.0e-04	1.2e-03
U-234	5.9e-04	7.5e-05	3.4e-04	1.1e-03	1.8e-03	1.2e-04	1.5e-05	6.6e-05	2.3e-04	3.5e-04
U-235	1.1e+00	1.4e-01	6.4e-01	2.2e+00	3.4e+00	2.2e-01	2.8e-02	1.3e-01	4.3e-01	6.6e-01
U-236	3.2e-04	4.0e-05	1.8e-04	6.1e-04	9.6e-04	6.2e-05	7.9e-06	3.5e-05	1.2e-04	1.9e-04
U-238	2.0e-01	2.5e-02	1.1e-01	3.8e-01	5.9e-01	3.8e-02	4.9e-03	2.2e-02	7.5e-02	1.2e-01
Np-237	1.5e+00	2.0e-01	9.2e-01	3.1e+00	4.9e+00	3.2e-01	4.1e-02	1.8e-01	6.2e-01	9.6e-01
Pu-236	5.8e-04	5.8e-05	3.1e-04	1.1e-03	1.8e-03	1.1e-04	1.1e-05	6.1e-05	2.2e-04	3.5e-04
Pu-238	2.2e-04	2.8e-05	1.3e-04	4.3e-04	6.7e-04	4.4e-05	5.6e-06	2.5e-05	8.6e-05	1.3e-04
Pu-239	4.4e-04	5.5e-05	2.5e-04	8.4e-04	1.3e-03	8.6e-05	1.1e-05	4.9e-05	1.7e-04	2.6e-04
Pu-240	2.2e-04	2.7e-05	1.2e-04	4.2e-04	6.5e-04	4.3e-05	5.4e-06	2.4e-05	8.3e-05	1.3e-04
Pu-241	1.8e-05	1.9e-06	9.9e-06	3.5e-05	5.4e-05	3.5e-06	3.8e-07	2.0e-06	6.9e-06	1.1e-05
Pu-242	1.9e-04	2.4e-05	1.1e-04	3.6e-04	5.7e-04	3.7e-05	4.8e-06	2.1e-05	7.2e-05	1.1e-04
Pu-244	3.0e+00	3.8e-01	1.7e+00	5.8e+00	9.0e+00	5.9e-01	7.5e-02	3.3e-01	1.1e+00	1.8e+00
Am-241	6.5e-02	8.1e-03	3.7e-02	1.2e-01	2.0e-01	1.3e-02	1.6e-03	7.2e-03	2.5e-02	3.8e-02
Am-242m	9.9e-02	1.2e-02	5.6e-02	1.9e-01	3.0e-01	1.9e-02	2.5e-03	1.1e-02	3.8e-02	5.9e-02
Am-243	1.3e+00	1.7e-01	7.5e-01	2.5e+00	4.0e+00	2.6e-01	3.3e-02	1.5e-01	5.1e-01	7.9e-01
Cm-242	2.2e-04	2.8e-05	1.2e-04	4.3e-04	6.7e-04	4.3e-05	5.7e-06	2.5e-05	8.4e-05	1.3e-04
Cm-243	8.6e-01	1.1e-01	4.9e-01	1.6e+00	2.6e+00	1.7e-01	2.2e-02	9.6e-02	3.3e-01	5.1e-01
Cm-244	1.9e-04	2.3e-05	1.1e-04	3.6e-04	5.6e-04	3.6e-05	4.7e-06	2.1e-05	7.1e-05	1.1e-04
Cm-245	5.0e-01	6.3e-02	2.8e-01	9.6e-01	1.5e+00	9.9e-02	1.3e-02	5.6e-02	1.9e-01	3.0e-01
Cm-246	1.7e-04	2.2e-05	9.7e-05	3.3e-04	5.2e-04	3.4e-05	4.3e-06	1.9e-05	6.6e-05	1.0e-04
Cm-247	2.7e+00	3.4e-01	1.6e+00	5.3e+00	8.3e+00	5.4e-01	6.9e-02	3.1e-01	1.1e+00	1.6e+00
Cm-248	1.3e-04	1.6e-05	7.4e-05	2.5e-04	3.9e-04	2.5e-05	3.3e-06	1.4e-05	5.0e-05	7.7e-05
Bk-249	4.7e-04	3.9e-05	2.4e-04	9.4e-04	1.5e-03	9.3e-05	7.8e-06	4.8e-05	1.9e-04	2.9e-04
Cf-248	1.7e-04	2.2e-05	9.8e-05	3.3e-04	5.2e-04	3.4e-05	4.4e-06	1.9e-05	6.6e-05	1.0e-04
Cf-249	2.7e+00	3.4e-01	1.6e+00	5.3e+00	8.2e+00	5.4e-01	6.8e-02	3.1e-01	1.0e+00	1.6e+00
Cf-250	1.7e-04	2.2e-05	9.9e-05	3.4e-04	5.3e-04	3.4e-05	4.4e-06	1.9e-05	6.7e-05	1.0e-04
Cf-251	7.8e-01	9.7e-02	4.4e-01	1.5e+00	2.3e+00	1.5e-01	1.9e-02	8.7e-02	3.0e-01	4.7e-01
Cf-252	2.5e-04	3.2e-05	1.4e-04	4.9e-04	7.7e-04	5.0e-05	6.4e-06	2.8e-05	9.7e-05	1.5e-04
Cf-254	4.0e-07	5.2e-08	2.2e-07	7.7e-07	1.2e-06	7.8e-08	1.0e-08	4.4e-08	1.5e-07	2.4e-07
Es-254	7.8e+00	9.7e-01	4.3e+00	1.5e+01	2.3e+01	1.5e+00	1.9e-01	8.5e-01	2.9e+00	4.5e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.7 Normalized effective dose equivalents from inhalation: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	4.1e-04	4.9e-05	2.3e-04	8.3e-04	1.2e-03	8.0e-05	9.7e-06	4.4e-05	1.6e-04	2.5e-04
P-32	1.2e-04	1.2e-05	5.7e-05	2.5e-04	4.2e-04	2.4e-05	2.4e-06	1.1e-05	5.0e-05	8.1e-05
S-35	1.8e-04	2.2e-05	9.8e-05	3.6e-04	5.5e-04	3.5e-05	4.3e-06	1.9e-05	7.0e-05	1.1e-04
Cl-36	5.6e-04	4.8e-05	2.9e-04	1.2e-03	1.9e-03	1.1e-04	9.2e-06	5.6e-05	2.3e-04	3.7e-04
K-40	6.8e-04	8.1e-05	3.7e-04	1.4e-03	2.1e-03	1.3e-04	1.6e-05	7.3e-05	2.7e-04	4.0e-04
Ca-41	1.4e-04	1.7e-05	7.7e-05	2.8e-04	4.3e-04	2.7e-05	3.3e-06	1.5e-05	5.6e-05	8.4e-05
Ca-45	6.0e-04	7.4e-05	3.3e-04	1.2e-03	1.8e-03	1.2e-04	1.5e-05	6.5e-05	2.4e-04	3.6e-04
Sc-46	2.4e-03	2.9e-04	1.3e-03	4.7e-03	7.2e-03	4.6e-04	5.9e-05	2.6e-04	9.3e-04	1.4e-03
Cr-51	5.6e-06	4.0e-07	2.7e-06	1.2e-05	1.9e-05	1.1e-06	8.0e-08	5.4e-07	2.3e-06	3.7e-06
Mn-53	4.7e-05	5.4e-06	2.6e-05	9.5e-05	1.4e-04	9.3e-06	1.1e-06	5.1e-06	1.9e-05	2.8e-05
Mn-54	5.9e-04	6.9e-05	3.2e-04	1.2e-03	1.8e-03	1.2e-04	1.4e-05	6.4e-05	2.3e-04	3.5e-04
Fe-55	3.7e-06	3.3e-07	2.0e-06	7.5e-06	1.2e-05	7.2e-07	6.5e-08	3.9e-07	1.5e-06	2.3e-06
Fe-59	2.1e-05	2.0e-06	1.1e-05	4.3e-05	6.7e-05	4.1e-06	4.0e-07	2.2e-06	8.4e-06	1.3e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.4e-04	1.8e-05	7.6e-05	2.8e-04	4.4e-04	2.8e-05	3.6e-06	1.5e-05	5.5e-05	8.5e-05
Sr-89	4.4e-04	5.6e-05	2.4e-04	8.7e-04	1.3e-03	8.6e-05	1.1e-05	4.8e-05	1.7e-04	2.6e-04
Sr-90	2.6e-02	3.1e-03	1.4e-02	5.2e-02	7.8e-02	5.0e-03	6.1e-04	2.8e-03	1.0e-02	1.5e-02
Y-91	3.5e-03	4.4e-04	1.9e-03	6.9e-03	1.1e-02	6.8e-04	8.9e-05	3.8e-04	1.4e-03	2.1e-03
Zr-93	8.6e-03	1.0e-03	4.8e-03	1.7e-02	2.6e-02	1.7e-03	2.1e-04	9.4e-04	3.4e-03	5.2e-03
Zr-95	1.4e-03	1.7e-04	7.7e-04	2.8e-03	4.2e-03	2.7e-04	3.5e-05	1.5e-04	5.5e-04	8.3e-04
Nb-93m	3.0e-03	3.6e-04	1.7e-03	6.1e-03	9.2e-03	5.9e-04	7.2e-05	3.3e-04	1.2e-03	1.8e-03
Nb-94	4.3e-02	5.1e-03	2.4e-02	8.7e-02	1.3e-01	8.4e-03	1.0e-03	4.7e-03	1.7e-02	2.6e-02
Nb-95	3.3e-04	4.2e-05	1.8e-04	6.6e-04	1.0e-03	6.4e-05	8.2e-06	3.5e-05	1.3e-04	2.0e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.5e-05	4.4e-06	2.8e-05	1.2e-04	1.8e-04	1.1e-05	8.7e-07	5.5e-06	2.3e-05	3.7e-05
Sb-125	4.3e-05	3.2e-06	2.2e-05	9.0e-05	1.4e-04	8.5e-06	6.4e-07	4.3e-06	1.8e-05	2.8e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.3e-04	3.5e-05	2.1e-04	9.1e-04	1.4e-03	8.5e-05	6.9e-06	4.2e-05	1.8e-04	2.7e-04
I-129	4.5e-03	3.5e-04	2.2e-03	9.4e-03	1.4e-02	8.8e-04	6.9e-05	4.4e-04	1.8e-03	2.8e-03
I-131	8.9e-05	2.9e-06	2.6e-05	2.0e-04	3.5e-04	1.7e-05	5.6e-07	5.5e-06	3.8e-05	6.8e-05
Cs-134	1.2e-04	1.0e-05	5.9e-05	2.4e-04	3.7e-04	2.3e-05	2.0e-06	1.2e-05	4.8e-05	7.3e-05
Cs-135	1.2e-05	1.0e-06	5.9e-06	2.4e-05	3.8e-05	2.3e-06	2.1e-07	1.2e-06	4.8e-06	7.4e-06
Cs-137	8.2e-05	7.3e-06	4.2e-05	1.7e-04	2.7e-04	1.6e-05	1.4e-06	8.2e-06	3.4e-05	5.2e-05
Ba-133	8.0e-04	9.6e-05	4.4e-04	1.6e-03	2.5e-03	1.6e-04	1.9e-05	8.8e-05	3.2e-04	4.8e-04
Ce-139	8.0e-04	9.9e-05	4.4e-04	1.6e-03	2.4e-03	1.6e-04	2.0e-05	8.7e-05	3.2e-04	4.8e-04
Ce-141	4.8e-04	6.1e-05	2.6e-04	9.7e-04	1.5e-03	9.4e-05	1.2e-05	5.1e-05	1.9e-04	2.9e-04
Ce-144	3.8e-02	4.4e-03	2.0e-02	7.2e-02	1.1e-01	7.0e-03	8.7e-04	3.9e-03	1.4e-02	2.1e-02
Pm-147	4.0e-03	4.8e-04	2.2e-03	8.0e-03	1.2e-02	7.8e-04	9.5e-05	4.3e-04	1.6e-03	2.4e-03

Table F1.7 Normalized effective dose equivalents from inhalation: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.1e-03	3.7e-04	1.7e-03	6.3e-03	9.4e-03	6.1e-04	7.4e-05	3.4e-04	1.2e-03	1.9e-03
Eu-152	2.3e-02	2.7e-03	1.3e-02	4.6e-02	6.9e-02	4.5e-03	5.4e-04	2.5e-03	9.1e-03	1.4e-02
Eu-154	2.9e-02	3.5e-03	1.6e-02	5.9e-02	9.0e-02	5.8e-03	7.0e-04	3.2e-03	1.2e-02	1.8e-02
Eu-155	4.2e-03	5.1e-04	2.3e-03	8.5e-03	1.3e-02	8.3e-04	1.0e-04	4.6e-04	1.7e-03	2.5e-03
Gd-153	8.9e-04	1.1e-04	4.9e-04	1.8e-03	2.7e-03	1.8e-04	2.2e-05	9.8e-05	3.6e-04	5.4e-04
Tb-160	1.9e-03	2.4e-04	1.1e-03	3.8e-03	5.9e-03	3.7e-04	4.8e-05	2.1e-04	7.5e-04	1.1e-03
Tm-170	2.5e-03	2.9e-04	1.3e-03	4.6e-03	7.0e-03	4.5e-04	5.7e-05	2.5e-04	9.1e-04	1.4e-03
Tm-171	9.2e-04	1.1e-04	5.1e-04	1.9e-03	2.8e-03	1.8e-04	2.2e-05	1.0e-04	3.7e-04	5.5e-04
Ta-182	3.8e-03	4.8e-04	2.1e-03	7.7e-03	1.2e-02	7.5e-04	9.5e-05	4.2e-04	1.5e-03	2.3e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	8.9e-01	1.1e-01	5.0e-01	1.8e+00	2.7e+00	1.8e-01	2.1e-02	9.8e-02	3.6e-01	5.4e-01
Ra-228	1.6e+00	1.6e-01	8.6e-01	3.3e+00	5.0e+00	3.2e-01	3.1e-02	1.7e-01	6.6e-01	9.9e-01
Ac-227	1.4e+02	1.6e+01	7.5e+01	2.7e+02	4.1e+02	2.7e+01	3.3e+00	1.5e+01	5.4e+01	8.1e+01
Th-228	3.5e+01	4.2e+00	1.9e+01	7.0e+01	1.1e+02	6.8e+00	8.3e-01	3.8e+00	1.4e+01	2.1e+01
Th-229	1.8e+02	2.2e+01	1.0e+02	3.7e+02	5.5e+02	3.5e+01	4.3e+00	2.0e+01	7.2e+01	1.1e+02
Th-230	2.7e+01	3.2e+00	1.5e+01	5.5e+01	8.3e+01	5.3e+00	6.5e-01	3.0e+00	1.1e+01	1.6e+01
Th-232	1.2e+02	1.4e+01	6.6e+01	2.4e+02	3.6e+02	2.3e+01	2.9e+00	1.3e+01	4.8e+01	7.2e+01
Pa-231	8.9e+01	1.1e+01	4.9e+01	1.8e+02	2.7e+02	1.8e+01	2.1e+00	9.7e+00	3.5e+01	5.4e+01
U-232	6.8e+01	8.2e+00	3.8e+01	1.4e+02	2.1e+02	1.4e+01	1.7e+00	7.6e+00	2.8e+01	4.2e+01
U-233	1.4e+01	1.7e+00	7.8e+00	2.8e+01	4.3e+01	2.8e+00	3.4e-01	1.5e+00	5.6e+00	8.4e+00
U-234	1.4e+01	1.6e+00	7.6e+00	2.8e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.5e+00	8.2e+00
U-235	1.3e+01	1.5e+00	7.0e+00	2.6e+01	3.9e+01	2.5e+00	3.0e-01	1.4e+00	5.1e+00	7.6e+00
U-236	1.3e+01	1.6e+00	7.2e+00	2.6e+01	4.0e+01	2.6e+00	3.1e-01	1.4e+00	5.2e+00	7.8e+00
U-238	1.2e+01	1.5e+00	6.8e+00	2.5e+01	3.7e+01	2.4e+00	2.9e-01	1.3e+00	4.9e+00	7.4e+00
Np-237	5.8e+01	6.7e+00	3.1e+01	1.1e+02	1.7e+02	1.1e+01	1.3e+00	6.1e+00	2.2e+01	3.4e+01
Pu-236	1.3e+01	1.6e+00	7.3e+00	2.7e+01	4.0e+01	2.6e+00	3.2e-01	1.4e+00	5.3e+00	7.9e+00
Pu-238	3.0e+01	3.5e+00	1.7e+01	6.1e+01	9.1e+01	5.9e+00	7.2e-01	3.3e+00	1.2e+01	1.8e+01
Pu-239	3.2e+01	3.8e+00	1.8e+01	6.5e+01	9.8e+01	6.3e+00	7.7e-01	3.5e+00	1.3e+01	1.9e+01
Pu-240	3.2e+01	3.8e+00	1.8e+01	6.5e+01	9.8e+01	6.3e+00	7.7e-01	3.5e+00	1.3e+01	1.9e+01
Pu-241	5.2e-01	6.1e-02	2.9e-01	1.1e+00	1.6e+00	1.0e-01	1.2e-02	5.6e-02	2.1e-01	3.1e-01
Pu-242	3.0e+01	3.6e+00	1.7e+01	6.2e+01	9.3e+01	6.0e+00	7.3e-01	3.3e+00	1.2e+01	1.8e+01
Pu-244	3.0e+01	3.6e+00	1.7e+01	6.1e+01	9.2e+01	5.9e+00	7.2e-01	3.3e+00	1.2e+01	1.8e+01
Am-241	4.6e+01	5.5e+00	2.5e+01	9.3e+01	1.4e+02	9.0e+00	1.1e+00	5.0e+00	1.8e+01	2.8e+01
Am-242m	4.6e+01	5.4e+00	2.5e+01	9.2e+01	1.4e+02	9.0e+00	1.1e+00	5.0e+00	1.8e+01	2.7e+01
Am-243	4.6e+01	5.4e+00	2.5e+01	9.2e+01	1.4e+02	9.0e+00	1.1e+00	5.0e+00	1.8e+01	2.8e+01
Cm-242	1.6e+00	2.0e-01	8.7e-01	3.2e+00	4.8e+00	3.1e-01	3.9e-02	1.7e-01	6.3e-01	9.5e-01
Cm-243	3.2e+01	3.8e+00	1.8e+01	6.5e+01	9.6e+01	6.2e+00	7.6e-01	3.5e+00	1.3e+01	1.9e+01
Cm-244	2.6e+01	3.1e+00	1.4e+01	5.2e+01	7.8e+01	5.0e+00	6.1e-01	2.8e+00	1.0e+01	1.5e+01
Cm-245	4.7e+01	5.6e+00	2.6e+01	9.6e+01	1.4e+02	9.3e+00	1.1e+00	5.2e+00	1.9e+01	2.8e+01
Cm-246	4.7e+01	5.6e+00	2.6e+01	9.5e+01	1.4e+02	9.2e+00	1.1e+00	5.1e+00	1.9e+01	2.8e+01
Cm-247	4.3e+01	5.1e+00	2.4e+01	8.7e+01	1.3e+02	8.4e+00	1.0e+00	4.7e+00	1.7e+01	2.6e+01
Cm-248	1.7e+02	2.0e+01	9.5e+01	3.5e+02	5.2e+02	3.4e+01	4.1e+00	1.9e+01	6.8e+01	1.0e+02
Bk-249	1.4e-01	1.7e-02	7.8e-02	2.8e-01	4.2e-01	2.8e-02	3.4e-03	1.5e-02	5.6e-02	8.5e-02
Cf-248	5.0e+00	6.1e-01	2.8e+00	1.0e+01	1.5e+01	9.8e-01	1.2e-01	5.5e-01	2.0e+00	3.0e+00
Cf-249	3.9e+01	4.7e+00	2.2e+01	8.0e+01	1.2e+02	7.8e+00	9.4e-01	4.3e+00	1.6e+01	2.4e+01
Cf-250	2.1e+01	2.5e+00	1.2e+01	4.3e+01	6.5e+01	4.2e+00	5.1e-01	2.3e+00	8.4e+00	1.3e+01
Cf-251	4.0e+01	4.8e+00	2.2e+01	8.1e+01	1.2e+02	7.9e+00	9.6e-01	4.4e+00	1.6e+01	2.4e+01
Cf-252	1.6e+01	1.9e+00	8.8e+00	3.2e+01	4.8e+01	3.1e+00	3.8e-01	1.7e+00	6.3e+00	9.5e+00
Cf-254	2.1e+01	2.7e+00	1.2e+01	4.2e+01	6.5e+01	4.2e+00	5.4e-01	2.3e+00	8.3e+00	1.3e+01
Es-254	4.0e+00	4.9e-01	2.2e+00	8.1e+00	1.2e+01	7.9e-01	9.8e-02	4.4e-01	1.6e+00	2.4e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.8 Normalized effective dose equivalents from ingestion: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.0e-03	8.4e-05	1.0e-03	4.2e-03	6.6e-03	4.0e-04	1.7e-05	2.0e-04	8.3e-04	1.3e-03
P-32	5.8e-04	1.9e-05	2.4e-04	1.3e-03	2.1e-03	1.1e-04	3.8e-06	4.8e-05	2.5e-04	4.1e-04
S-35	1.1e-04	4.4e-06	5.4e-05	2.2e-04	3.5e-04	2.1e-05	8.8e-07	1.1e-05	4.4e-05	6.9e-05
Cl-36	2.6e-04	7.6e-06	1.2e-04	5.7e-04	8.9e-04	5.1e-05	1.5e-06	2.3e-05	1.1e-04	1.8e-04
K-40	3.4e-03	1.4e-04	1.7e-03	7.1e-03	1.1e-02	6.6e-04	2.7e-05	3.4e-04	1.4e-03	2.2e-03
Ca-41	4.4e-04	1.8e-05	2.2e-04	9.2e-04	1.4e-03	8.6e-05	3.6e-06	4.4e-05	1.8e-04	2.8e-04
Ca-45	9.5e-04	3.9e-05	4.8e-04	2.0e-03	3.1e-03	1.9e-04	7.9e-06	9.6e-05	3.9e-04	6.1e-04
Sc-46	1.7e-03	7.1e-05	8.6e-04	3.6e-03	5.5e-03	3.3e-04	1.4e-05	1.7e-04	7.0e-04	1.1e-03
Cr-51	8.2e-06	2.2e-07	3.5e-06	1.8e-05	2.9e-05	1.6e-06	4.4e-08	7.0e-07	3.5e-06	5.7e-06
Mn-53	3.4e-05	1.4e-06	1.7e-05	7.2e-05	1.1e-04	6.6e-06	2.8e-07	3.4e-06	1.4e-05	2.2e-05
Mn-54	8.0e-04	3.3e-05	4.1e-04	1.7e-03	2.6e-03	1.6e-04	6.6e-06	8.1e-05	3.4e-04	5.2e-04
Fe-55	5.5e-06	1.8e-07	2.6e-06	1.2e-05	1.9e-05	1.1e-06	3.7e-08	5.1e-07	2.3e-06	3.8e-06
Fe-59	3.8e-05	1.3e-06	1.8e-05	8.2e-05	1.3e-04	7.5e-06	2.6e-07	3.5e-06	1.6e-05	2.6e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	4.6e-04	2.0e-05	2.5e-04	1.0e-03	1.6e-03	9.5e-05	4.1e-06	4.9e-05	2.0e-04	3.1e-04
Sr-89	2.1e-03	8.8e-05	1.0e-03	4.4e-03	6.8e-03	4.0e-04	1.7e-05	2.1e-04	8.6e-04	1.4e-03
Sr-90	5.2e-02	2.2e-03	2.7e-02	1.1e-01	1.7e-01	1.0e-02	4.3e-04	5.3e-03	2.2e-02	3.4e-02
Y-91	2.2e-03	9.4e-05	1.1e-03	4.7e-03	7.3e-03	4.4e-04	1.9e-05	2.3e-04	9.3e-04	1.5e-03
Zr-93	5.7e-04	2.3e-05	2.9e-04	1.2e-03	1.8e-03	1.1e-04	4.6e-06	5.7e-05	2.4e-04	3.6e-04
Zr-95	1.2e-03	5.2e-05	6.4e-04	2.7e-03	4.1e-03	2.5e-04	1.0e-05	1.3e-04	5.2e-04	8.0e-04
Nb-93m	1.8e-04	7.3e-06	9.2e-05	3.8e-04	5.8e-04	3.5e-05	1.5e-06	1.8e-05	7.4e-05	1.1e-04
Nb-94	2.4e-03	1.0e-04	1.3e-03	5.2e-03	7.9e-03	4.8e-04	2.0e-05	2.5e-04	1.0e-03	1.6e-03
Nb-95	4.8e-04	2.0e-05	2.4e-04	1.0e-03	1.6e-03	9.4e-05	4.0e-06	4.7e-05	2.0e-04	3.2e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	7.4e-05	2.3e-06	3.3e-05	1.6e-04	2.6e-04	1.4e-05	4.4e-07	6.5e-06	3.2e-05	5.1e-05
Sb-125	3.7e-05	1.1e-06	1.7e-05	8.1e-05	1.3e-04	7.3e-06	2.2e-07	3.3e-06	1.6e-05	2.6e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	2.3e-03	8.9e-05	1.0e-03	4.9e-03	7.7e-03	4.4e-04	1.4e-05	2.0e-04	9.8e-04	1.5e-03
I-129	2.3e-02	8.9e-04	1.1e-02	5.1e-02	7.9e-02	4.6e-03	1.4e-04	2.1e-03	1.0e-02	1.5e-02
I-131	4.8e-04	8.8e-06	1.3e-04	1.1e-03	1.9e-03	9.4e-05	1.3e-06	2.5e-05	2.1e-04	3.8e-04
Cs-134	6.0e-04	1.9e-05	2.8e-04	1.3e-03	2.1e-03	1.2e-04	3.9e-06	5.4e-05	2.6e-04	4.0e-04
Cs-135	6.0e-05	1.9e-06	2.7e-05	1.3e-04	2.1e-04	1.2e-05	3.9e-07	5.4e-06	2.6e-05	4.0e-05
Cs-137	4.2e-04	1.4e-05	1.9e-04	9.2e-04	1.5e-03	8.3e-05	2.7e-06	3.8e-05	1.8e-04	2.8e-04
Ba-133	1.2e-03	4.8e-05	6.0e-04	2.5e-03	3.7e-03	2.3e-04	9.5e-06	1.2e-04	4.8e-04	7.5e-04
Ce-139	3.3e-04	1.4e-05	1.7e-04	7.1e-04	1.1e-03	6.6e-05	2.8e-06	3.4e-05	1.4e-04	2.1e-04
Ce-141	5.2e-04	2.2e-05	2.5e-04	1.1e-03	1.7e-03	1.0e-04	4.3e-06	5.1e-05	2.1e-04	3.5e-04
Ce-144	6.7e-03	2.8e-04	3.4e-03	1.4e-02	2.2e-02	1.3e-03	5.5e-05	6.8e-04	2.8e-03	4.3e-03
Pm-147	3.5e-04	1.4e-05	1.8e-04	7.4e-04	1.1e-03	6.9e-05	2.8e-06	3.5e-05	1.5e-04	2.2e-04

Table F1.8 Normalized effective dose equivalents from ingestion: Handling slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.3e-04	5.5e-06	6.9e-05	2.8e-04	4.3e-04	2.6e-05	1.1e-06	1.3e-05	5.5e-05	8.5e-05
Eu-152	2.2e-03	9.0e-05	1.1e-03	4.6e-03	7.1e-03	4.3e-04	1.8e-05	2.2e-04	9.2e-04	1.4e-03
Eu-154	3.2e-03	1.3e-04	1.7e-03	6.8e-03	1.0e-02	6.4e-04	2.6e-05	3.3e-04	1.4e-03	2.1e-03
Eu-155	5.2e-04	2.1e-05	2.7e-04	1.1e-03	1.7e-03	1.0e-04	4.2e-06	5.2e-05	2.2e-04	3.3e-04
Gd-153	3.7e-04	1.5e-05	1.9e-04	7.8e-04	1.2e-03	7.2e-05	3.0e-06	3.7e-05	1.5e-04	2.4e-04
Tb-160	1.7e-03	7.2e-05	8.7e-04	3.6e-03	5.5e-03	3.3e-04	1.4e-05	1.7e-04	7.1e-04	1.1e-03
Tm-170	1.5e-03	6.4e-05	7.8e-04	3.2e-03	5.0e-03	3.0e-04	1.3e-05	1.5e-04	6.3e-04	9.8e-04
Tm-171	1.4e-04	5.9e-06	7.3e-05	3.0e-04	4.6e-04	2.8e-05	1.2e-06	1.4e-05	5.9e-05	9.2e-05
Ta-182	1.8e-03	7.7e-05	9.4e-04	3.9e-03	6.0e-03	3.6e-04	1.5e-05	1.9e-04	7.6e-04	1.2e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	4.6e-01	1.9e-02	2.4e-01	9.8e-01	1.5e+00	9.0e-02	3.7e-03	4.6e-02	1.9e-01	2.9e-01
Ra-228	5.0e-01	2.0e-02	2.6e-01	1.1e+00	1.6e+00	9.7e-02	4.0e-03	5.0e-02	2.1e-01	3.2e-01
Ac-227	5.0e+00	2.1e-01	2.6e+00	1.1e+01	1.6e+01	9.9e-01	4.1e-02	5.1e-01	2.1e+00	3.3e+00
Th-228	2.7e-01	1.1e-02	1.4e-01	5.7e-01	8.7e-01	5.3e-02	2.2e-03	2.7e-02	1.1e-01	1.7e-01
Th-229	1.4e+00	5.7e-02	7.1e-01	2.9e+00	4.5e+00	2.7e-01	1.1e-02	1.4e-01	5.7e-01	8.8e-01
Th-230	1.9e-01	7.7e-03	9.7e-02	4.0e-01	6.1e-01	3.7e-02	1.6e-03	1.9e-02	7.8e-02	1.2e-01
Th-232	9.4e-01	3.9e-02	4.8e-01	2.0e+00	3.0e+00	1.8e-01	7.8e-03	9.5e-02	3.9e-01	6.0e-01
Pa-231	3.6e+00	1.5e-01	1.9e+00	7.7e+00	1.2e+01	7.2e-01	3.0e-02	3.7e-01	1.5e+00	2.3e+00
U-232	3.2e-02	1.3e-03	1.6e-02	6.9e-02	1.1e-01	6.4e-03	2.6e-04	3.2e-03	1.4e-02	2.1e-02
U-233	9.1e-03	3.7e-04	4.6e-03	1.9e-02	2.9e-02	1.8e-03	7.4e-05	9.2e-04	3.8e-03	5.8e-03
U-234	9.0e-03	3.7e-04	4.6e-03	1.9e-02	2.9e-02	1.8e-03	7.3e-05	9.0e-04	3.7e-03	5.7e-03
U-235	9.6e-03	3.9e-04	4.9e-03	2.0e-02	3.1e-02	1.9e-03	7.8e-05	9.7e-04	4.0e-03	6.2e-03
U-236	8.5e-03	3.5e-04	4.3e-03	1.8e-02	2.7e-02	1.7e-03	6.9e-05	8.6e-04	3.5e-03	5.4e-03
U-238	1.3e-02	5.2e-04	6.6e-03	2.7e-02	4.2e-02	2.5e-03	1.0e-04	1.3e-03	5.3e-03	8.2e-03
Np-237	1.5e+00	6.2e-02	7.8e-01	3.2e+00	4.9e+00	3.0e-01	1.3e-02	1.5e-01	6.3e-01	9.7e-01
Pu-236	3.9e-01	1.6e-02	2.0e-01	8.3e-01	1.3e+00	7.7e-02	3.2e-03	3.9e-02	1.6e-01	2.5e-01
Pu-238	1.1e+00	4.5e-02	5.6e-01	2.3e+00	3.5e+00	2.2e-01	9.0e-03	1.1e-01	4.6e-01	7.0e-01
Pu-239	1.2e+00	5.0e-02	6.2e-01	2.6e+00	3.9e+00	2.4e-01	1.0e-02	1.2e-01	5.1e-01	7.8e-01
Pu-240	1.2e+00	5.0e-02	6.2e-01	2.6e+00	3.9e+00	2.4e-01	1.0e-02	1.2e-01	5.1e-01	7.8e-01
Pu-241	2.4e-02	9.7e-04	1.2e-02	5.0e-02	7.6e-02	4.6e-03	1.9e-04	2.4e-03	9.8e-03	1.5e-02
Pu-242	1.2e+00	4.7e-02	5.9e-01	2.4e+00	3.7e+00	2.3e-01	9.5e-03	1.2e-01	4.8e-01	7.4e-01
Pu-244	1.1e+00	4.7e-02	5.9e-01	2.4e+00	3.7e+00	2.2e-01	9.4e-03	1.1e-01	4.8e-01	7.3e-01
Am-241	1.2e+00	5.1e-02	6.4e-01	2.6e+00	4.0e+00	2.5e-01	1.0e-02	1.3e-01	5.2e-01	8.0e-01
Am-242m	1.2e+00	5.1e-02	6.4e-01	2.6e+00	4.0e+00	2.4e-01	1.0e-02	1.3e-01	5.1e-01	8.0e-01
Am-243	1.2e+00	5.1e-02	6.4e-01	2.6e+00	4.0e+00	2.4e-01	1.0e-02	1.3e-01	5.2e-01	8.0e-01
Cm-242	3.5e-02	1.5e-03	1.8e-02	7.4e-02	1.1e-01	6.9e-03	2.9e-04	3.5e-03	1.5e-02	2.3e-02
Cm-243	8.6e-01	3.5e-02	4.4e-01	1.8e+00	2.8e+00	1.7e-01	7.0e-03	8.7e-02	3.6e-01	5.5e-01
Cm-244	6.9e-01	2.8e-02	3.5e-01	1.5e+00	2.2e+00	1.4e-01	5.6e-03	7.0e-02	2.9e-01	4.4e-01
Cm-245	1.3e+00	5.2e-02	6.6e-01	2.7e+00	4.1e+00	2.5e-01	1.0e-02	1.3e-01	5.3e-01	8.2e-01
Cm-246	1.3e+00	5.2e-02	6.5e-01	2.7e+00	4.1e+00	2.5e-01	1.0e-02	1.3e-01	5.3e-01	8.1e-01
Cm-247	1.2e+00	4.8e-02	6.0e-01	2.5e+00	3.8e+00	2.3e-01	9.6e-03	1.2e-01	4.9e-01	7.5e-01
Cm-248	4.7e+00	1.9e-01	2.4e+00	9.9e+00	1.5e+01	9.2e-01	3.8e-02	4.7e-01	1.9e+00	3.0e+00
Bk-249	4.1e-03	1.7e-04	2.1e-03	8.7e-03	1.3e-02	8.1e-04	3.3e-05	4.1e-04	1.7e-03	2.6e-03
Cf-248	1.1e-01	4.5e-03	5.6e-02	2.3e-01	3.6e-01	2.2e-02	9.0e-04	1.1e-02	4.6e-02	7.0e-02
Cf-249	1.6e+00	6.6e-02	8.4e-01	3.4e+00	5.2e+00	3.2e-01	1.3e-02	1.6e-01	6.7e-01	1.0e+00
Cf-250	7.3e-01	3.0e-02	3.7e-01	1.5e+00	2.4e+00	1.4e-01	6.0e-03	7.3e-02	3.0e-01	4.7e-01
Cf-251	1.7e+00	6.8e-02	8.6e-01	3.5e+00	5.4e+00	3.3e-01	1.4e-02	1.7e-01	6.9e-01	1.1e+00
Cf-252	3.6e-01	1.5e-02	1.9e-01	7.7e-01	1.2e+00	7.1e-02	3.0e-03	3.7e-02	1.5e-01	2.3e-01
Cf-254	5.8e-01	2.4e-02	2.9e-01	1.2e+00	1.9e+00	1.1e-01	4.9e-03	5.8e-02	2.4e-01	3.8e-01
Es-254	1.0e-01	4.2e-03	5.3e-02	2.2e-01	3.3e-01	2.0e-02	8.4e-04	1.0e-02	4.3e-02	6.6e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.9 Normalized effective dose equivalents from all pathways: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.7e+01	1.1e+01	1.7e+01	2.3e+01	2.5e+01	3.4e+00	2.2e+00	3.3e+00	4.5e+00	4.8e+00
P-32	3.8e-04	9.5e-05	3.0e-04	7.8e-04	9.6e-04	7.6e-05	1.9e-05	5.9e-05	1.5e-04	1.8e-04
S-35	2.6e-05	9.3e-06	2.3e-05	4.3e-05	5.1e-05	5.1e-06	1.9e-06	4.6e-06	8.5e-06	9.9e-06
Cl-36	3.9e-03	1.1e-03	3.5e-03	6.9e-03	8.0e-03	7.6e-04	2.2e-04	7.0e-04	1.3e-03	1.6e-03
K-40	1.4e+00	8.7e-01	1.4e+00	1.9e+00	2.0e+00	2.8e-01	1.8e-01	2.7e-01	3.7e-01	3.9e-01
Ca-41	7.5e-05	2.0e-05	6.9e-05	1.3e-04	1.6e-04	1.5e-05	4.0e-06	1.4e-05	2.6e-05	3.1e-05
Ca-45	2.0e-04	7.0e-05	1.9e-04	3.5e-04	4.1e-04	4.0e-05	1.4e-05	3.7e-05	6.8e-05	7.9e-05
Sc-46	1.3e+00	6.6e-01	1.2e+00	1.9e+00	2.1e+00	2.5e-01	1.3e-01	2.4e-01	3.7e-01	4.1e-01
Cr-51	4.1e-03	1.5e-03	3.6e-03	7.2e-03	8.5e-03	8.2e-04	3.1e-04	7.2e-04	1.4e-03	1.7e-03
Mn-53	8.5e-06	3.8e-06	8.0e-06	1.3e-05	1.5e-05	1.7e-06	7.7e-07	1.6e-06	2.6e-06	2.9e-06
Mn-54	4.5e-01	2.8e-01	4.4e-01	6.2e-01	6.6e-01	9.0e-02	5.8e-02	8.8e-02	1.2e-01	1.3e-01
Fe-55	1.2e-05	3.7e-06	1.0e-05	2.0e-05	2.4e-05	2.3e-06	7.4e-07	2.1e-06	4.0e-06	4.7e-06
Fe-59	1.6e-01	6.9e-02	1.5e-01	2.6e-01	3.0e-01	3.2e-02	1.4e-02	3.0e-02	5.1e-02	5.8e-02
Co-56	6.0e-01	2.7e-01	5.6e-01	9.5e-01	1.1e+00	1.2e-01	5.6e-02	1.1e-01	1.8e-01	2.0e-01
Co-57	8.2e-03	2.9e-03	5.8e-03	9.6e-03	1.1e-02	1.2e-03	5.9e-04	1.2e-03	1.9e-03	2.1e-03
Co-58	1.5e-01	6.6e-02	1.4e-01	2.3e-01	2.6e-01	2.9e-02	1.3e-02	2.7e-02	4.5e-02	5.0e-02
Co-60	5.6e-01	2.6e-01	5.3e-01	8.7e-01	9.5e-01	1.1e-01	5.3e-02	1.0e-01	1.7e-01	1.8e-01
Ni-59	8.8e-06	3.8e-06	8.2e-06	1.4e-05	1.6e-05	1.7e-06	7.7e-07	1.6e-06	2.7e-06	3.1e-06
Ni-63	1.5e-05	5.5e-06	1.4e-05	2.6e-05	3.0e-05	3.0e-06	1.1e-06	2.7e-06	5.0e-06	5.8e-06
Zn-65	8.3e+00	5.3e+00	8.2e+00	1.1e+01	1.2e+01	1.6e+00	1.1e+00	1.6e+00	2.2e+00	2.3e+00
As-73	1.2e-03	5.4e-04	1.2e-03	1.9e-03	2.2e-03	2.4e-04	1.1e-04	2.3e-04	3.7e-04	4.2e-04
Se-75	2.8e+00	1.8e+00	2.8e+00	3.8e+00	4.1e+00	5.6e-01	3.6e-01	5.5e-01	7.4e-01	7.9e-01
Sr-85	2.5e-01	1.3e-01	2.3e-01	3.7e-01	4.1e-01	4.8e-02	2.6e-02	4.6e-02	7.2e-02	8.0e-02
Sr-89	1.2e-03	5.9e-04	1.1e-03	1.9e-03	2.2e-03	2.4e-04	1.2e-04	2.3e-04	3.7e-04	4.2e-04
Sr-90	1.4e-02	6.1e-03	1.3e-02	2.3e-02	2.7e-02	2.9e-03	1.2e-03	2.7e-03	4.5e-03	5.1e-03
Y-91	3.9e-03	1.9e-03	3.6e-03	5.9e-03	6.6e-03	7.6e-04	3.9e-04	7.2e-04	1.1e-03	1.3e-03
Zr-93	1.2e-03	5.2e-04	1.1e-03	1.9e-03	2.2e-03	2.4e-04	1.0e-04	2.2e-04	3.7e-04	4.4e-04
Zr-95	6.3e-01	3.3e-01	6.0e-01	9.1e-01	1.0e+00	1.2e-01	6.8e-02	1.2e-01	1.8e-01	2.0e-01
Nb-93m	4.1e-04	1.7e-04	3.8e-04	6.7e-04	7.7e-04	8.2e-05	3.5e-05	7.4e-05	1.3e-04	1.5e-04
Nb-94	1.2e+00	6.6e-01	1.2e+00	1.8e+00	2.0e+00	2.4e-01	1.3e-01	2.3e-01	3.5e-01	3.8e-01
Nb-95	3.2e-01	1.4e-01	2.9e-01	5.2e-01	5.9e-01	6.4e-02	2.9e-02	5.8e-02	1.0e-01	1.2e-01
Mo-93	1.2e-04	4.7e-05	1.1e-04	1.9e-04	2.3e-04	2.3e-05	9.5e-06	2.1e-05	3.8e-05	4.5e-05
Tc-97	5.6e-06	2.2e-06	5.1e-06	9.4e-06	1.1e-05	1.1e-06	4.4e-07	1.0e-06	1.8e-06	2.1e-06
Tc-97m	3.3e-05	1.3e-05	3.0e-05	5.4e-05	6.3e-05	6.6e-06	2.7e-06	6.0e-06	1.1e-05	1.2e-05
Tc-99	5.0e-05	2.0e-05	4.5e-05	8.2e-05	9.6e-05	9.8e-06	3.9e-06	8.9e-06	1.6e-05	1.9e-05
Ru-103	5.3e-02	2.2e-02	4.8e-02	8.5e-02	9.8e-02	1.0e-02	4.4e-03	9.5e-03	1.7e-02	1.9e-02
Ru-106	4.3e-02	2.0e-02	4.0e-02	6.5e-02	7.2e-02	8.4e-03	4.0e-03	8.0e-03	1.3e-02	1.4e-02
Ag-108m	3.7e+00	1.3e+00	3.5e+00	6.2e+00	7.0e+00	7.3e-01	2.6e-01	6.8e-01	1.2e+00	1.4e+00
Ag-110m	6.3e+00	2.2e+00	5.8e+00	1.0e+01	1.2e+01	1.2e+00	4.4e-01	1.2e+00	2.0e+00	2.3e+00
Cd-109	3.0e-02	1.5e-02	2.8e-02	4.4e-02	4.9e-02	5.8e-03	3.0e-03	5.6e-03	8.6e-03	9.5e-03
Sn-113	3.6e-02	1.6e-02	3.4e-02	5.6e-02	6.1e-02	7.0e-03	3.3e-03	6.7e-03	1.1e-02	1.2e-02
Sb-124	2.7e+00	9.2e-01	2.5e+00	4.6e+00	5.3e+00	5.3e-01	1.9e-01	4.9e-01	9.1e-01	1.0e+00
Sb-125	7.3e-01	2.6e-01	6.8e-01	1.2e+00	1.4e+00	1.4e-01	5.3e-02	1.3e-01	2.4e-01	2.7e-01
Te-123m	6.6e-01	4.1e-01	6.5e-01	9.0e-01	9.6e-01	1.3e-01	8.5e-02	1.3e-01	1.7e-01	1.8e-01
Te-127m	8.2e-02	3.8e-02	6.1e-02	8.5e-02	9.1e-02	1.2e-02	7.9e-03	1.2e-02	1.6e-02	1.8e-02
I-125	7.1e-03	1.1e-03	5.6e-03	1.5e-02	1.8e-02	1.4e-03	2.1e-04	1.1e-03	2.9e-03	3.5e-03
I-129	7.2e-02	1.1e-02	5.7e-02	1.5e-01	1.8e-01	1.4e-02	2.2e-03	1.1e-02	2.9e-02	3.6e-02
I-131	1.3e-01	7.1e-03	6.1e-02	3.4e-01	4.8e-01	2.5e-02	1.4e-03	1.2e-02	6.8e-02	9.4e-02
Cs-134	2.3e+01	1.5e+01	2.3e+01	3.1e+01	3.3e+01	4.5e+00	3.0e+00	4.5e+00	5.9e+00	6.3e+00
Cs-135	7.7e-03	1.9e-03	7.3e-03	1.4e-02	1.5e-02	1.5e-03	3.8e-04	1.4e-03	2.6e-03	3.0e-03
Cs-137	8.5e+00	5.4e+00	8.3e+00	1.1e+01	1.2e+01	1.7e+00	1.1e+00	1.6e+00	2.2e+00	2.3e+00
Ba-133	2.0e-01	1.1e-01	1.9e-01	2.9e-01	3.3e-01	3.9e-02	2.2e-02	3.8e-02	5.7e-02	6.3e-02
Ce-139	3.6e-02	1.9e-02	3.4e-02	5.3e-02	5.9e-02	7.1e-03	3.9e-03	6.8e-03	1.0e-02	1.1e-02
Ce-141	9.8e-03	4.3e-03	8.9e-03	1.6e-02	1.8e-02	1.9e-03	8.7e-04	1.8e-03	3.1e-03	3.5e-03
Ce-144	3.8e-02	2.1e-02	3.6e-02	5.5e-02	6.2e-02	7.5e-03	4.1e-03	7.2e-03	1.1e-02	1.2e-02
Pm-147	5.6e-04	2.5e-04	5.1e-04	9.0e-04	1.0e-03	1.1e-04	5.0e-05	1.0e-04	1.8e-04	2.1e-04

Table F1.9 Normalized effective dose equivalents from all pathways: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.2e-04	1.8e-04	3.9e-04	6.7e-04	7.8e-04	8.3e-05	3.6e-05	7.6e-05	1.3e-04	1.5e-04
Eu-152	9.0e-01	4.8e-01	8.5e-01	1.3e+00	1.5e+00	1.8e-01	9.6e-02	1.7e-01	2.5e-01	2.8e-01
Eu-154	8.8e-01	4.7e-01	8.4e-01	1.3e+00	1.4e+00	1.7e-01	9.5e-02	1.7e-01	2.5e-01	2.7e-01
Eu-155	6.8e-03	3.6e-03	6.4e-03	9.9e-03	1.1e-02	1.3e-03	7.2e-04	1.3e-03	1.9e-03	2.1e-03
Gd-153	7.3e-03	3.9e-03	7.0e-03	1.1e-02	1.2e-02	1.4e-03	7.8e-04	1.4e-03	2.1e-03	2.3e-03
Tb-160	6.5e-01	3.4e-01	6.2e-01	9.6e-01	1.1e+00	1.3e-01	6.8e-02	1.2e-01	1.9e-01	2.1e-01
Tm-170	9.5e-04	4.7e-04	9.0e-04	1.4e-03	1.6e-03	1.9e-04	9.5e-05	1.8e-04	2.8e-04	3.1e-04
Tm-171	1.6e-04	7.1e-05	1.4e-04	2.4e-04	2.8e-04	3.1e-05	1.4e-05	2.9e-05	4.7e-05	5.4e-05
Ta-182	8.3e-01	4.3e-01	7.9e-01	1.2e+00	1.4e+00	1.6e-01	8.8e-02	1.6e-01	2.4e-01	2.6e-01
W-181	3.1e-04	1.4e-04	2.9e-04	4.8e-04	5.4e-04	6.1e-05	2.9e-05	5.8e-05	9.5e-05	1.0e-04
W-185	2.2e-05	6.5e-06	1.9e-05	3.8e-05	4.5e-05	4.3e-06	1.3e-06	3.7e-06	7.5e-06	8.8e-06
Os-185	7.6e+00	4.7e+00	7.4e+00	1.0e+01	1.1e+01	1.5e+00	9.5e-01	1.5e+00	2.0e+00	2.1e+00
Ir-192	1.0e-01	4.5e-02	9.4e-02	1.6e-01	1.8e-01	2.0e-02	8.9e-03	1.9e-02	3.1e-02	3.4e-02
Tl-204	7.9e-03	4.3e-03	7.6e-03	1.1e-02	1.3e-02	1.6e-03	8.7e-04	1.5e-03	2.2e-03	2.4e-03
Pb-210	1.2e+01	5.1e+00	1.2e+01	1.9e+01	2.2e+01	2.4e+00	1.0e+00	2.3e+00	3.8e+00	4.2e+00
Bi-207	2.3e+01	1.5e+01	2.3e+01	3.1e+01	3.2e+01	4.5e+00	3.0e+00	4.5e+00	5.9e+00	6.2e+00
Po-210	3.3e+00	1.5e+00	3.2e+00	5.2e+00	5.8e+00	6.8e-01	3.0e-01	6.3e-01	1.0e+00	1.1e+00
Ra-226	1.6e+00	8.4e-01	1.5e+00	2.3e+00	2.5e+00	3.1e-01	1.7e-01	3.0e-01	4.4e-01	4.9e-01
Ra-228	9.9e-01	5.2e-01	9.4e-01	1.4e+00	1.6e+00	1.9e-01	1.0e-01	1.9e-01	2.8e-01	3.1e-01
Ac-227	1.9e+01	7.8e+00	1.7e+01	3.0e+01	3.5e+01	3.7e+00	1.6e+00	3.3e+00	5.9e+00	6.8e+00
Th-228	5.7e+00	2.6e+00	5.2e+00	8.8e+00	1.0e+01	1.1e+00	5.3e-01	1.0e+00	1.7e+00	2.0e+00
Th-229	2.4e+01	1.0e+01	2.2e+01	3.9e+01	4.5e+01	4.7e+00	2.0e+00	4.3e+00	7.8e+00	8.9e+00
Th-230	3.6e+00	1.5e+00	3.2e+00	5.8e+00	6.8e+00	7.0e-01	3.0e-01	6.4e-01	1.1e+00	1.3e+00
Th-232	1.6e+01	6.6e+00	1.4e+01	2.5e+01	3.0e+01	3.1e+00	1.3e+00	2.8e+00	5.0e+00	5.8e+00
Pa-231	1.2e+01	5.2e+00	1.1e+01	2.0e+01	2.3e+01	2.4e+00	1.0e+00	2.2e+00	3.8e+00	4.4e+00
U-232	9.1e+00	3.8e+00	8.3e+00	1.5e+01	1.7e+01	1.8e+00	7.7e-01	1.6e+00	2.9e+00	3.4e+00
U-233	1.8e+00	7.7e-01	1.7e+00	3.0e+00	3.5e+00	3.6e-01	1.5e-01	3.3e-01	5.8e-01	6.8e-01
U-234	1.8e+00	7.5e-01	1.6e+00	2.9e+00	3.4e+00	3.5e-01	1.5e-01	3.2e-01	5.7e-01	6.6e-01
U-235	1.7e+00	7.4e-01	1.6e+00	2.8e+00	3.2e+00	3.4e-01	1.5e-01	3.1e-01	5.4e-01	6.3e-01
U-236	1.7e+00	7.1e-01	1.5e+00	2.7e+00	3.2e+00	3.3e-01	1.4e-01	3.1e-01	5.4e-01	6.3e-01
U-238	1.6e+00	6.9e-01	1.5e+00	2.6e+00	3.1e+00	3.2e-01	1.4e-01	2.9e-01	5.1e-01	6.0e-01
Np-237	7.8e+00	3.2e+00	6.9e+00	1.2e+01	1.4e+01	1.5e+00	6.5e-01	1.4e+00	2.4e+00	2.8e+00
Pu-236	1.8e+00	7.4e-01	1.6e+00	2.9e+00	3.4e+00	3.5e-01	1.5e-01	3.2e-01	5.6e-01	6.5e-01
Pu-238	4.0e+00	1.7e+00	3.7e+00	6.5e+00	7.7e+00	7.9e-01	3.4e-01	7.2e-01	1.3e+00	1.5e+00
Pu-239	4.3e+00	1.8e+00	3.9e+00	6.9e+00	8.2e+00	8.5e-01	3.6e-01	7.8e-01	1.4e+00	1.6e+00
Pu-240	4.3e+00	1.8e+00	3.9e+00	6.9e+00	8.2e+00	8.5e-01	3.6e-01	7.8e-01	1.4e+00	1.6e+00
Pu-241	7.1e-02	3.0e-02	6.4e-02	1.1e-01	1.3e-01	1.4e-02	6.0e-03	1.3e-02	2.2e-02	2.6e-02
Pu-242	4.1e+00	1.7e+00	3.7e+00	6.6e+00	7.8e+00	8.1e-01	3.5e-01	7.4e-01	1.3e+00	1.5e+00
Pu-244	4.3e+00	1.9e+00	3.9e+00	6.8e+00	8.1e+00	8.5e-01	3.7e-01	7.8e-01	1.3e+00	1.6e+00
Am-241	6.2e+00	2.6e+00	5.6e+00	1.0e+01	1.1e+01	1.2e+00	5.2e-01	1.1e+00	1.9e+00	2.2e+00
Am-242m	6.1e+00	2.6e+00	5.6e+00	9.9e+00	1.1e+01	1.2e+00	5.2e-01	1.1e+00	1.9e+00	2.2e+00
Am-243	6.2e+00	2.6e+00	5.6e+00	9.9e+00	1.1e+01	1.2e+00	5.2e-01	1.1e+00	1.9e+00	2.2e+00
Cm-242	2.1e-01	8.8e-02	1.9e-01	3.4e-01	3.9e-01	4.1e-02	1.8e-02	3.8e-02	6.6e-02	7.7e-02
Cm-243	4.3e+00	1.8e+00	3.9e+00	7.0e+00	8.0e+00	8.4e-01	3.7e-01	7.7e-01	1.3e+00	1.6e+00
Cm-244	3.4e+00	1.5e+00	3.1e+00	5.5e+00	6.4e+00	6.7e-01	2.9e-01	6.2e-01	1.1e+00	1.3e+00
Cm-245	6.3e+00	2.7e+00	5.8e+00	1.0e+01	1.2e+01	1.2e+00	5.4e-01	1.1e+00	2.0e+00	2.3e+00
Cm-246	6.2e+00	2.7e+00	5.7e+00	1.0e+01	1.2e+01	1.2e+00	5.3e-01	1.1e+00	2.0e+00	2.3e+00
Cm-247	5.9e+00	2.6e+00	5.4e+00	9.6e+00	1.1e+01	1.2e+00	5.2e-01	1.1e+00	1.9e+00	2.2e+00
Cm-248	2.3e+01	9.7e+00	2.1e+01	3.7e+01	4.3e+01	4.5e+00	2.0e+00	4.1e+00	7.2e+00	8.5e+00
Bk-249	1.9e-02	8.0e-03	1.7e-02	3.0e-02	3.6e-02	3.7e-03	1.6e-03	3.4e-03	6.0e-03	7.0e-03
Cf-248	6.6e-01	2.8e-01	6.0e-01	1.1e+00	1.2e+00	1.3e-01	5.6e-02	1.2e-01	2.1e-01	2.5e-01
Cf-249	5.5e+00	2.4e+00	5.1e+00	8.9e+00	1.0e+01	1.1e+00	4.8e-01	1.0e+00	1.8e+00	2.0e+00
Cf-250	2.9e+00	1.2e+00	2.6e+00	4.6e+00	5.4e+00	5.6e-01	2.4e-01	5.1e-01	9.1e-01	1.1e+00
Cf-251	5.5e+00	2.3e+00	5.0e+00	8.9e+00	1.0e+01	1.1e+00	4.6e-01	9.9e-01	1.7e+00	2.0e+00
Cf-252	2.1e+00	8.8e-01	1.9e+00	3.4e+00	4.0e+00	4.2e-01	1.8e-01	3.8e-01	6.7e-01	7.8e-01
Cf-254	1.3e+01	6.3e+00	1.2e+01	1.9e+01	2.2e+01	2.5e+00	1.3e+00	2.4e+00	3.8e+00	4.2e+00
Es-254	1.2e+00	6.1e-01	1.2e+00	1.8e+00	2.0e+00	2.4e-01	1.2e-01	2.3e-01	3.5e-01	3.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.10 Normalized effective dose equivalents from external exposure: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.7e+01	1.1e+01	1.7e+01	2.3e+01	2.5e+01	3.4e+00	2.2e+00	3.3e+00	4.5e+00	4.8e+00
P-32	3.1e-04	7.8e-05	2.4e-04	6.2e-04	7.6e-04	6.0e-05	1.6e-05	4.7e-05	1.2e-04	1.5e-04
S-35	2.6e-07	1.2e-07	2.5e-07	4.1e-07	4.6e-07	5.2e-08	2.4e-08	4.9e-08	8.0e-08	9.0e-08
Cl-36	1.8e-03	5.1e-04	1.7e-03	3.2e-03	3.6e-03	3.6e-04	1.0e-04	3.3e-04	6.2e-04	7.1e-04
K-40	1.4e+00	8.6e-01	1.4e+00	1.9e+00	2.0e+00	2.7e-01	1.8e-01	2.7e-01	3.6e-01	3.9e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	3.1e-06	1.6e-06	3.0e-06	4.6e-06	5.0e-06	6.2e-07	3.4e-07	5.9e-07	8.9e-07	9.8e-07
Sc-46	1.3e+00	8.6e-01	1.2e+00	1.9e+00	2.1e+00	2.5e-01	1.3e-01	2.4e-01	3.7e-01	4.1e-01
Cr-51	4.1e-03	1.5e-03	3.6e-03	7.2e-03	8.5e-03	8.2e-04	3.1e-04	7.2e-04	1.4e-03	1.7e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.5e-01	2.8e-01	4.4e-01	6.2e-01	6.6e-01	9.0e-02	5.8e-02	8.8e-02	1.2e-01	1.3e-01
Fe-55	8.8e-12	4.2e-12	8.4e-12	1.4e-11	1.5e-11	1.7e-12	8.3e-13	1.7e-12	2.6e-12	3.0e-12
Fe-59	1.6e-01	6.9e-02	1.5e-01	2.6e-01	3.0e-01	3.2e-02	1.4e-02	3.0e-02	5.1e-02	5.8e-02
Co-56	6.0e-01	2.7e-01	5.6e-01	9.5e-01	1.1e+00	1.2e-01	5.6e-02	1.1e-01	1.8e-01	2.0e-01
Co-57	8.2e-03	2.9e-03	5.8e-03	9.6e-03	1.1e-02	1.2e-03	5.8e-04	1.2e-03	1.8e-03	2.0e-03
Co-58	1.5e-01	6.6e-02	1.4e-01	2.3e-01	2.6e-01	2.9e-02	1.3e-02	2.7e-02	4.5e-02	5.0e-02
Co-60	5.6e-01	2.6e-01	5.3e-01	8.6e-01	9.5e-01	1.1e-01	5.3e-02	1.0e-01	1.7e-01	1.8e-01
Ni-59	3.0e-06	1.4e-06	2.8e-06	4.6e-06	5.0e-06	5.9e-07	2.8e-07	5.6e-07	8.9e-07	9.7e-07
Ni-63	7.0e-10	3.3e-10	6.6e-10	1.1e-09	1.2e-09	1.4e-10	6.6e-11	1.3e-10	2.1e-10	2.3e-10
Zn-65	8.3e+00	5.2e+00	8.1e+00	1.1e+01	1.2e+01	1.6e+00	1.1e+00	1.6e+00	2.2e+00	2.3e+00
As-73	8.1e-04	3.6e-04	7.6e-04	1.2e-03	1.4e-03	1.6e-04	7.3e-05	1.5e-04	2.4e-04	2.7e-04
Se-75	2.8e+00	1.8e+00	2.8e+00	3.8e+00	4.1e+00	5.6e-01	3.6e-01	5.5e-01	7.4e-01	7.9e-01
Sr-85	2.5e-01	1.3e-01	2.3e-01	3.7e-01	4.1e-01	4.8e-02	2.6e-02	4.6e-02	7.2e-02	8.0e-02
Sr-89	9.1e-04	4.6e-04	8.5e-04	1.4e-03	1.6e-03	1.8e-04	9.3e-05	1.7e-04	2.7e-04	3.1e-04
Sr-90	4.3e-03	2.3e-03	4.1e-03	6.1e-03	6.8e-03	8.4e-04	4.7e-04	8.1e-04	1.2e-03	1.3e-03
Y-91	3.1e-03	1.6e-03	2.9e-03	4.7e-03	5.3e-03	6.2e-04	3.2e-04	5.8e-04	9.2e-04	1.0e-03
Zr-93	3.1e-09	1.7e-09	3.0e-09	4.5e-09	5.0e-09	6.1e-10	3.3e-10	5.9e-10	8.7e-10	9.6e-10
Zr-95	6.3e-01	3.3e-01	6.0e-01	9.1e-01	1.0e+00	1.2e-01	6.8e-02	1.2e-01	1.8e-01	2.0e-01
Nb-93m	1.3e-09	7.0e-10	1.2e-09	1.9e-09	2.1e-09	2.6e-10	1.4e-10	2.5e-10	3.7e-10	4.1e-10
Nb-94	1.2e+00	6.6e-01	1.2e+00	1.8e+00	2.0e+00	2.4e-01	1.3e-01	2.3e-01	3.5e-01	3.8e-01
Nb-95	3.2e-01	1.4e-01	2.9e-01	5.2e-01	5.9e-01	6.4e-02	2.9e-02	5.8e-02	1.0e-01	1.2e-01
Mo-93	1.2e-09	5.8e-10	1.1e-09	1.9e-09	2.1e-09	2.4e-10	1.2e-10	2.3e-10	3.6e-10	4.0e-10
Tc-97	4.6e-09	2.2e-09	4.3e-09	7.0e-09	7.8e-09	9.0e-10	4.3e-10	8.5e-10	1.4e-09	1.5e-09
Tc-97m	8.1e-06	3.7e-06	7.6e-06	1.3e-05	1.4e-05	1.6e-06	7.4e-07	1.5e-06	2.5e-06	2.8e-06
Tc-99	2.2e-06	1.1e-06	2.1e-06	3.4e-06	3.8e-06	4.4e-07	2.1e-07	4.2e-07	6.7e-07	7.4e-07
Ru-103	5.3e-02	2.2e-02	4.8e-02	8.5e-02	9.8e-02	1.0e-02	4.4e-03	9.5e-03	1.7e-02	1.9e-02
Ru-106	4.1e-02	1.9e-02	3.9e-02	6.2e-02	6.9e-02	8.0e-03	3.8e-03	7.6e-03	1.2e-02	1.3e-02
Ag-108m	3.7e+00	1.3e+00	3.5e+00	6.2e+00	7.0e+00	7.3e-01	2.6e-01	6.8e-01	1.2e+00	1.4e+00
Ag-110m	6.3e+00	2.2e+00	5.8e+00	1.0e+01	1.2e+01	1.2e+00	4.4e-01	1.2e+00	2.0e+00	2.3e+00
Cd-109	8.4e-03	4.1e-03	8.3e-03	8.6e-03	9.1e-03	1.3e-03	8.4e-04	1.2e-03	1.6e-03	1.8e-03
Sn-113	3.6e-02	1.6e-02	3.4e-02	5.5e-02	6.1e-02	7.0e-03	3.3e-03	6.7e-03	1.1e-02	1.2e-02
Sb-124	2.7e+00	9.2e-01	2.5e+00	4.6e+00	5.3e+00	5.3e-01	1.9e-01	4.9e-01	9.0e-01	1.0e+00
Sb-125	7.3e-01	2.6e-01	6.8e-01	1.2e+00	1.4e+00	1.4e-01	5.3e-02	1.3e-01	2.4e-01	2.7e-01
Te-123m	6.6e-01	4.1e-01	6.4e-01	8.9e-01	9.5e-01	1.3e-01	8.5e-02	1.3e-01	1.7e-01	1.8e-01
Te-127m	5.1e-02	3.2e-02	5.0e-02	6.9e-02	7.4e-02	1.0e-02	6.6e-03	9.9e-03	1.3e-02	1.4e-02
I-125	1.6e-04	4.2e-05	1.5e-04	2.9e-04	3.4e-04	3.2e-05	8.4e-06	2.9e-05	5.6e-05	6.6e-05
I-129	3.0e-04	8.1e-05	2.8e-04	5.3e-04	6.0e-04	5.9e-05	1.6e-05	5.5e-05	1.0e-04	1.2e-04
I-131	1.3e-01	7.0e-03	6.0e-02	3.4e-01	4.7e-01	2.5e-02	1.4e-03	1.2e-02	6.7e-02	9.3e-02
Cs-134	2.3e+01	1.5e+01	2.2e+01	3.1e+01	3.3e+01	4.5e+00	3.0e+00	4.5e+00	5.9e+00	6.2e+00
Cs-135	1.9e-04	1.2e-04	1.9e-04	2.6e-04	2.7e-04	3.8e-05	2.5e-05	3.7e-05	4.9e-05	5.2e-05
Cs-137	8.4e+00	5.4e+00	8.2e+00	1.1e+01	1.2e+01	1.7e+00	1.1e+00	1.6e+00	2.2e+00	2.3e+00
Ba-133	2.0e-01	1.1e-01	1.9e-01	2.9e-01	3.2e-01	3.9e-02	2.2e-02	3.8e-02	5.7e-02	6.3e-02
Ce-139	3.6e-02	1.9e-02	3.4e-02	5.2e-02	5.8e-02	7.1e-03	3.8e-03	6.7e-03	1.0e-02	1.1e-02
Ce-141	9.7e-03	4.2e-03	8.8e-03	1.6e-02	1.8e-02	1.9e-03	8.6e-04	1.7e-03	3.1e-03	3.5e-03
Ce-144	3.3e-02	1.8e-02	3.1e-02	4.7e-02	5.3e-02	6.4e-03	3.5e-03	6.2e-03	9.2e-03	1.0e-02
Pm-147	2.4e-06	1.3e-06	2.3e-06	3.5e-06	3.8e-06	4.7e-07	2.6e-07	4.6e-07	6.8e-07	7.5e-07

Table F1.10 Normalized effective dose equivalents from external exposure: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	6.6e-09	3.5e-09	6.4e-09	9.6e-09	1.1e-08	1.3e-09	7.3e-10	1.3e-09	1.9e-09	2.1e-09
Eu-152	8.9e-01	4.7e-01	8.5e-01	1.3e+00	1.4e+00	1.8e-01	9.8e-02	1.7e-01	2.5e-01	2.8e-01
Eu-154	8.8e-01	4.7e-01	8.4e-01	1.3e+00	1.4e+00	1.7e-01	9.4e-02	1.7e-01	2.5e-01	2.7e-01
Eu-155	6.1e-03	3.3e-03	5.9e-03	8.9e-03	1.0e-02	1.2e-03	6.6e-04	1.2e-03	1.7e-03	1.9e-03
Gd-153	7.1e-03	3.8e-03	6.8e-03	1.0e-02	1.2e-02	1.4e-03	7.6e-04	1.3e-03	2.1e-03	2.3e-03
Tb-160	6.5e-01	3.3e-01	6.2e-01	9.6e-01	1.1e+00	1.3e-01	6.7e-02	1.2e-01	1.9e-01	2.1e-01
Tm-170	4.5e-04	2.4e-04	4.3e-04	6.6e-04	7.2e-04	8.9e-05	4.8e-05	8.5e-05	1.3e-04	1.4e-04
Tm-171	1.8e-05	9.6e-06	1.7e-05	2.6e-05	2.8e-05	3.5e-06	1.9e-06	3.4e-06	5.1e-06	5.5e-06
Ta-182	8.3e-01	4.3e-01	7.9e-01	1.2e+00	1.4e+00	1.6e-01	8.8e-02	1.6e-01	2.4e-01	2.6e-01
W-181	3.1e-04	1.4e-04	2.9e-04	4.8e-04	5.3e-04	6.1e-05	2.8e-05	5.8e-05	9.4e-05	1.0e-04
W-185	5.5e-06	2.5e-06	5.2e-06	8.6e-06	9.7e-06	1.1e-06	5.0e-07	1.0e-06	1.7e-06	1.9e-06
Os-185	7.6e+00	4.7e+00	7.4e+00	1.0e+01	1.1e+01	1.5e+00	9.6e-01	1.5e+00	2.0e+00	2.1e+00
Ir-192	1.0e-01	4.5e-02	9.4e-02	1.6e-01	1.8e-01	2.0e-02	8.9e-03	1.9e-02	3.1e-02	3.4e-02
Tl-204	4.4e-03	2.8e-03	4.3e-03	5.8e-03	6.2e-03	8.6e-04	5.8e-04	8.5e-04	1.1e-03	1.2e-03
Pb-210	1.1e-02	6.7e-03	1.0e-02	1.4e-02	1.5e-02	2.1e-03	1.4e-03	2.1e-03	2.7e-03	2.9e-03
Bi-207	2.3e+01	1.5e+01	2.3e+01	3.1e+01	3.2e+01	4.5e+00	3.0e+00	4.5e+00	6.9e+00	6.2e+00
Po-210	1.3e-04	8.0e-05	1.3e-04	1.7e-04	1.8e-04	2.5e-05	1.7e-05	2.5e-05	3.3e-05	3.5e-05
Ra-226	1.4e+00	7.4e-01	1.3e+00	2.0e+00	2.2e+00	2.7e-01	1.5e-01	2.6e-01	3.9e-01	4.3e-01
Ra-228	7.1e-01	3.8e-01	6.8e-01	1.0e+00	1.1e+00	1.4e-01	7.7e-02	1.3e-01	2.0e-01	2.2e-01
Ac-227	2.1e-01	1.1e-01	2.0e-01	3.1e-01	3.4e-01	4.1e-02	2.3e-02	4.0e-02	6.0e-02	6.6e-02
Th-228	1.1e+00	6.1e-01	1.1e+00	1.6e+00	1.8e+00	2.2e-01	1.2e-01	2.2e-01	3.2e-01	3.6e-01
Th-229	1.5e-01	8.2e-02	1.5e-01	2.2e-01	2.4e-01	3.0e-02	1.6e-02	2.9e-02	4.3e-02	4.8e-02
Th-230	1.1e-04	5.1e-05	1.0e-04	1.7e-04	1.9e-04	2.1e-05	1.0e-05	2.0e-05	3.3e-05	3.7e-05
Th-232	7.5e-03	2.3e-03	6.8e-03	1.3e-02	1.5e-02	1.5e-03	4.6e-04	1.3e-03	2.6e-03	3.0e-03
Pa-231	1.8e-02	9.3e-03	1.7e-02	2.5e-02	2.8e-02	3.5e-03	1.9e-03	3.3e-03	5.0e-03	5.5e-03
U-232	3.8e-02	1.2e-02	3.4e-02	6.5e-02	7.5e-02	7.4e-03	2.4e-03	6.8e-03	1.3e-02	1.5e-02
U-233	7.3e-05	3.9e-05	7.0e-05	1.1e-04	1.2e-04	1.4e-05	7.9e-06	1.4e-05	2.1e-05	2.3e-05
U-234	1.3e-05	6.8e-06	1.2e-05	1.8e-05	2.0e-05	2.5e-06	1.4e-06	2.4e-06	3.6e-06	4.0e-06
U-235	5.7e-02	3.1e-02	5.4e-02	8.2e-02	9.1e-02	1.1e-02	6.2e-03	1.1e-02	1.6e-02	1.8e-02
U-236	5.0e-06	2.7e-06	4.8e-06	7.3e-06	8.1e-06	9.9e-07	5.5e-07	9.5e-07	1.4e-06	1.6e-06
U-238	1.9e-02	1.0e-02	1.8e-02	2.7e-02	3.0e-02	3.7e-03	2.0e-03	3.5e-03	5.3e-03	5.8e-03
Np-237	1.1e-01	5.7e-02	1.0e-01	1.6e-01	1.7e-01	2.1e-02	1.2e-02	2.0e-02	3.1e-02	3.3e-02
Pu-236	2.5e-05	6.2e-06	2.1e-05	4.8e-05	5.7e-05	4.9e-06	1.2e-06	4.1e-06	9.5e-06	1.1e-05
Pu-238	1.9e-06	1.0e-06	1.8e-06	2.8e-06	3.0e-06	3.7e-07	2.1e-07	3.6e-07	5.4e-07	5.9e-07
Pu-239	2.1e-05	1.1e-05	2.0e-05	3.0e-05	3.4e-05	4.1e-06	2.3e-06	4.0e-06	5.9e-06	6.5e-06
Pu-240	1.7e-06	9.2e-07	1.6e-06	2.5e-06	2.8e-06	3.4e-07	1.9e-07	3.3e-07	4.9e-07	5.4e-07
Pu-241	3.6e-07	1.9e-07	3.5e-07	5.4e-07	6.1e-07	7.2e-08	3.8e-08	6.8e-08	1.1e-07	1.2e-07
Pu-242	1.7e-06	8.8e-07	1.6e-06	2.4e-06	2.7e-06	3.3e-07	1.8e-07	3.1e-07	4.7e-07	5.2e-07
Pu-244	2.4e-01	1.3e-01	2.3e-01	3.6e-01	3.9e-01	4.8e-02	2.6e-02	4.6e-02	6.9e-02	7.6e-02
Am-241	8.1e-04	4.3e-04	7.8e-04	1.2e-03	1.3e-03	1.6e-04	8.7e-05	1.5e-04	2.3e-04	2.5e-04
Am-242m	4.5e-03	2.4e-03	4.3e-03	6.6e-03	7.3e-03	8.9e-04	4.8e-04	8.6e-04	1.3e-03	1.4e-03
Am-243	6.1e-02	3.3e-02	5.9e-02	8.9e-02	9.9e-02	1.2e-02	6.6e-03	1.2e-02	1.7e-02	1.9e-02
Cm-242	2.1e-06	1.1e-06	2.0e-06	3.1e-06	3.4e-06	4.2e-07	2.3e-07	4.0e-07	6.0e-07	6.7e-07
Cm-243	4.4e-02	2.3e-02	4.2e-02	6.3e-02	7.0e-02	8.6e-03	4.7e-03	8.3e-03	1.2e-02	1.4e-02
Cm-244	2.0e-06	1.1e-06	2.0e-06	3.0e-06	3.3e-06	4.0e-07	2.2e-07	3.9e-07	5.8e-07	6.4e-07
Cm-245	1.8e-02	9.8e-03	1.8e-02	2.7e-02	2.9e-02	3.6e-03	2.0e-03	3.5e-03	5.2e-03	5.7e-03
Cm-246	1.5e-07	8.0e-08	1.4e-07	2.2e-07	2.4e-07	3.0e-08	1.6e-08	2.9e-08	4.2e-08	4.7e-08
Cm-247	2.0e-01	1.1e-01	1.9e-01	2.9e-01	3.2e-01	3.9e-02	2.2e-02	3.8e-02	5.6e-02	6.2e-02
Cm-248	1.3e-07	7.0e-08	1.3e-07	1.9e-07	2.1e-07	2.6e-08	1.4e-08	2.5e-08	3.7e-08	4.1e-08
Bk-249	3.4e-05	1.1e-05	3.1e-05	5.9e-05	6.9e-05	6.7e-06	2.2e-06	6.0e-06	1.2e-05	1.4e-05
Cf-248	2.5e-06	1.4e-06	2.4e-06	3.7e-06	4.1e-06	5.0e-07	2.7e-07	4.8e-07	7.2e-07	8.0e-07
Cf-249	2.0e-01	1.1e-01	1.9e-01	2.9e-01	3.2e-01	3.9e-02	2.1e-02	3.7e-02	5.6e-02	6.2e-02
Cf-250	9.2e-08	4.9e-08	8.8e-08	1.3e-07	1.5e-07	1.8e-08	1.0e-08	1.7e-08	2.6e-08	2.9e-08
Cf-251	3.2e-02	1.7e-02	3.1e-02	4.7e-02	5.2e-02	6.3e-03	3.5e-03	6.0e-03	9.1e-03	1.0e-02
Cf-252	2.8e-06	1.5e-06	2.7e-06	4.1e-06	4.5e-06	5.5e-07	3.0e-07	5.2e-07	7.9e-07	8.8e-07
Cf-254	9.9e+00	5.0e+00	9.3e+00	1.5e+01	1.7e+01	1.9e+00	1.0e+00	1.8e+00	2.9e+00	3.3e+00
Es-254	6.8e-01	3.6e-01	6.5e-01	9.9e-01	1.1e+00	1.3e-01	7.2e-02	1.3e-01	1.9e-01	2.1e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.11 Normalized effective dose equivalents from inhalation: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.0e-03	4.8e-04	9.5e-04	1.6e-03	1.8e-03	2.0e-04	9.6e-05	1.9e-04	3.1e-04	3.6e-04
P-32	1.3e-05	2.8e-06	9.8e-06	2.8e-05	3.5e-05	2.6e-06	5.6e-07	1.9e-06	5.5e-06	6.8e-06
S-35	1.6e-05	5.6e-06	1.4e-05	2.7e-05	3.2e-05	3.1e-06	1.2e-06	2.8e-06	5.3e-06	6.3e-06
Cl-36	1.4e-03	3.4e-04	1.2e-03	2.6e-03	3.1e-03	2.8e-04	6.8e-05	2.4e-04	5.1e-04	6.2e-04
K-40	1.7e-03	7.8e-04	1.6e-03	2.6e-03	3.0e-03	3.3e-04	1.6e-04	3.1e-04	5.1e-04	5.9e-04
Ca-41	1.8e-05	7.5e-06	1.6e-05	2.9e-05	3.4e-05	3.6e-06	1.5e-06	3.2e-06	5.8e-06	6.7e-06
Ca-45	7.8e-05	3.2e-05	7.1e-05	1.3e-04	1.5e-04	1.5e-05	6.5e-06	1.4e-05	2.5e-05	2.9e-05
Sc-46	3.1e-04	1.3e-04	2.8e-04	5.0e-04	5.8e-04	6.0e-05	2.5e-05	5.5e-05	9.8e-05	1.1e-04
Cr-51	1.0e-06	3.1e-07	8.5e-07	1.9e-06	2.3e-06	2.0e-07	6.2e-08	1.7e-07	3.7e-07	4.5e-07
Mn-53	4.9e-06	2.3e-06	4.6e-06	7.7e-06	8.7e-06	9.7e-07	4.6e-07	9.1e-07	1.5e-06	1.7e-06
Mn-54	6.1e-05	2.8e-05	5.8e-05	9.6e-05	1.1e-04	1.2e-05	5.7e-06	1.1e-05	1.9e-05	2.1e-05
Fe-55	4.7e-06	1.7e-06	4.1e-06	7.9e-06	9.1e-06	9.2e-07	3.4e-07	8.2e-07	1.5e-06	1.8e-06
Fe-59	2.7e-05	9.1e-06	2.4e-05	4.6e-05	5.6e-05	5.3e-06	1.8e-06	4.6e-06	9.1e-06	1.1e-05
Co-56	1.1e-04	3.9e-05	9.4e-05	1.8e-04	2.1e-04	2.1e-05	7.8e-06	1.9e-05	3.5e-05	4.1e-05
Co-57	3.0e-05	1.1e-05	2.6e-05	5.0e-05	6.0e-05	5.8e-06	2.3e-06	5.2e-06	9.8e-06	1.2e-05
Co-58	2.8e-05	1.0e-05	2.5e-05	4.9e-05	5.7e-05	5.6e-06	2.1e-06	4.9e-06	9.5e-06	1.1e-05
Co-60	7.7e-04	2.9e-04	6.8e-04	1.3e-03	1.5e-03	1.5e-04	5.9e-05	1.4e-04	2.5e-04	3.0e-04
Ni-59	3.3e-06	1.2e-06	3.0e-06	5.5e-06	6.4e-06	6.5e-07	2.5e-07	5.8e-07	1.1e-06	1.3e-06
Ni-63	8.2e-06	3.1e-06	7.4e-06	1.4e-05	1.6e-05	1.6e-06	6.3e-07	1.5e-06	2.7e-06	3.2e-06
Zn-65	4.7e-03	2.2e-03	4.4e-03	7.3e-03	8.4e-03	9.3e-04	4.4e-04	8.7e-04	1.4e-03	1.6e-03
As-73	2.5e-04	9.1e-05	2.3e-04	4.2e-04	5.1e-04	5.0e-05	1.8e-05	4.5e-05	8.3e-05	9.9e-05
Se-75	1.9e-03	8.6e-04	1.7e-03	2.9e-03	3.3e-03	3.7e-04	1.7e-04	3.4e-04	5.6e-04	6.4e-04
Sr-85	1.8e-05	7.4e-06	1.7e-05	3.0e-05	3.6e-05	3.6e-06	1.5e-06	3.3e-06	5.9e-06	7.0e-06
Sr-89	5.7e-05	2.2e-05	5.1e-05	9.5e-05	1.1e-04	1.1e-05	4.5e-06	1.0e-05	1.9e-05	2.2e-05
Sr-90	3.3e-03	1.4e-03	3.0e-03	5.4e-03	6.3e-03	6.6e-04	2.8e-04	6.0e-04	1.1e-03	1.2e-03
Y-91	4.5e-04	1.8e-04	4.1e-04	7.5e-04	8.9e-04	9.0e-05	3.6e-05	8.1e-05	1.5e-04	1.7e-04
Zr-93	1.1e-03	4.7e-04	1.0e-03	1.8e-03	2.1e-03	2.2e-04	9.6e-05	2.0e-04	3.5e-04	4.2e-04
Zr-95	1.8e-04	7.5e-05	1.7e-04	3.0e-04	3.4e-04	3.6e-05	1.5e-05	3.3e-05	5.8e-05	6.8e-05
Nb-93m	3.9e-04	1.6e-04	3.6e-04	6.4e-04	7.3e-04	7.7e-05	3.2e-05	7.0e-05	1.2e-04	1.4e-04
Nb-94	5.6e-03	2.3e-03	5.1e-03	9.1e-03	1.0e-02	1.1e-03	4.5e-04	9.9e-04	1.8e-03	2.0e-03
Nb-95	4.2e-05	1.5e-05	3.7e-05	7.3e-05	8.7e-05	8.3e-06	3.0e-06	7.3e-06	1.4e-05	1.7e-05
Mo-93	1.0e-04	3.8e-05	9.2e-05	1.7e-04	2.0e-04	2.0e-05	7.8e-06	1.8e-05	3.4e-05	4.0e-05
Tc-97	3.6e-06	1.3e-06	3.2e-06	6.0e-06	7.1e-06	7.0e-07	2.7e-07	6.3e-07	1.2e-06	1.4e-06
Tc-97m	1.4e-05	5.0e-06	1.2e-05	2.3e-05	2.7e-05	2.7e-06	1.0e-06	2.4e-06	4.5e-06	5.3e-06
Tc-99	3.0e-05	1.1e-05	2.7e-05	5.0e-05	5.9e-05	5.9e-06	2.3e-06	5.3e-06	9.9e-06	1.2e-05
Ru-103	1.8e-05	6.2e-06	1.6e-05	3.2e-05	3.8e-05	3.6e-06	1.2e-06	3.2e-06	6.3e-06	7.5e-06
Ru-106	1.6e-03	6.1e-04	1.4e-03	2.7e-03	3.1e-03	3.2e-04	1.2e-04	2.8e-04	5.2e-04	6.1e-04
Ag-108m	1.3e-03	3.8e-04	1.1e-03	2.3e-03	2.7e-03	2.5e-04	7.4e-05	2.2e-04	4.5e-04	5.4e-04
Ag-110m	1.5e-03	4.6e-04	1.3e-03	2.8e-03	3.3e-03	3.0e-04	9.0e-05	2.7e-04	5.5e-04	6.4e-04
Cd-109	1.2e-02	5.6e-03	1.1e-02	1.8e-02	2.1e-02	2.3e-03	1.1e-03	2.2e-03	3.5e-03	4.1e-03
Sn-113	3.2e-05	1.2e-05	2.8e-05	5.4e-05	6.4e-05	6.2e-06	2.3e-06	5.6e-06	1.1e-05	1.2e-05
Sb-124	8.0e-04	1.7e-04	5.2e-04	1.1e-03	1.3e-03	1.2e-04	3.4e-05	1.0e-04	2.1e-04	2.6e-04
Sb-125	4.7e-04	1.4e-04	4.1e-04	8.4e-04	1.0e-03	9.2e-05	2.8e-05	8.1e-05	1.6e-04	2.0e-04
Te-123m	2.3e-03	1.1e-03	2.2e-03	3.6e-03	4.1e-03	4.6e-04	2.2e-04	4.3e-04	7.0e-04	8.0e-04
Te-127m	4.7e-03	2.2e-03	4.4e-03	7.2e-03	8.3e-03	9.2e-04	4.3e-04	8.6e-04	1.4e-03	1.6e-03
I-125	1.1e-03	2.5e-04	9.2e-04	2.0e-03	2.5e-03	2.2e-04	5.0e-05	1.8e-04	4.1e-04	5.0e-04
I-129	1.1e-02	2.7e-03	9.8e-03	2.1e-02	2.5e-02	2.2e-03	5.4e-04	1.9e-03	4.1e-03	5.0e-03
I-131	2.3e-04	1.1e-05	1.0e-04	6.3e-04	8.9e-04	4.6e-05	2.3e-06	2.0e-05	1.2e-04	1.7e-04
Cs-134	1.2e-02	5.7e-03	1.1e-02	1.8e-02	2.1e-02	2.4e-03	1.1e-03	2.2e-03	3.6e-03	4.2e-03
Cs-135	1.2e-03	5.8e-04	1.1e-03	1.9e-03	2.1e-03	2.4e-04	1.2e-04	2.3e-04	3.7e-04	4.2e-04
Cs-137	8.5e-03	4.0e-03	8.0e-03	1.3e-02	1.5e-02	1.7e-03	8.1e-04	1.6e-03	2.6e-03	3.0e-03
Ba-133	1.0e-04	4.3e-05	9.5e-05	1.7e-04	2.0e-04	2.1e-05	8.7e-06	1.9e-05	3.3e-05	3.9e-05
Ce-139	1.0e-04	4.4e-05	9.5e-05	1.7e-04	2.0e-04	2.0e-05	8.8e-06	1.9e-05	3.3e-05	3.9e-05
Ce-141	6.3e-05	2.2e-05	5.5e-05	1.1e-04	1.3e-04	1.2e-05	4.5e-06	1.1e-05	2.1e-05	2.5e-05
Ce-144	4.7e-03	2.0e-03	4.2e-03	7.6e-03	8.8e-03	9.2e-04	4.0e-04	8.4e-04	1.5e-03	1.7e-03
Pm-147	5.2e-04	2.2e-04	4.7e-04	8.3e-04	9.8e-04	1.0e-04	4.4e-05	9.3e-05	1.6e-04	1.9e-04

Table F1.11 Normalized effective dose equivalents from inhalation: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.0e-04	1.7e-04	3.7e-04	6.5e-04	7.5e-04	7.9e-05	3.3e-05	7.3e-05	1.3e-04	1.5e-04
Eu-152	3.0e-03	1.2e-03	2.7e-03	4.8e-03	5.7e-03	5.8e-04	2.5e-04	5.3e-04	9.4e-04	1.1e-03
Eu-154	3.8e-03	1.6e-03	3.5e-03	6.2e-03	7.3e-03	7.5e-04	3.2e-04	6.9e-04	1.2e-03	1.4e-03
Eu-155	5.5e-04	2.3e-04	5.0e-04	8.9e-04	1.1e-03	1.1e-04	4.6e-05	9.9e-05	1.7e-04	2.1e-04
Gd-153	1.2e-04	4.8e-05	1.1e-04	1.9e-04	2.2e-04	2.3e-05	9.7e-06	2.1e-05	3.7e-05	4.3e-05
Tb-160	2.5e-04	1.0e-04	2.2e-04	4.0e-04	4.8e-04	4.9e-05	2.0e-05	4.4e-05	8.0e-05	9.2e-05
Tm-170	3.0e-04	1.2e-04	2.7e-04	4.8e-04	5.6e-04	5.9e-05	2.4e-05	5.4e-05	9.4e-05	1.1e-04
Tm-171	1.2e-04	4.9e-05	1.1e-04	1.9e-04	2.2e-04	2.3e-05	1.0e-05	2.2e-05	3.8e-05	4.4e-05
Ta-182	5.0e-04	2.0e-04	4.5e-04	8.1e-04	9.4e-04	9.8e-05	4.0e-05	8.8e-05	1.6e-04	1.9e-04
W-181	4.5e-07	1.7e-07	4.0e-07	7.5e-07	9.1e-07	8.9e-08	3.3e-08	7.9e-08	1.5e-07	1.8e-07
W-185	2.0e-06	7.2e-07	1.8e-06	3.4e-06	4.1e-06	3.9e-07	1.5e-07	3.5e-07	6.6e-07	7.9e-07
Os-185	2.1e-03	9.4e-04	1.9e-03	3.2e-03	3.7e-03	4.1e-04	1.9e-04	3.8e-04	6.2e-04	7.2e-04
Ir-192	7.5e-05	2.7e-05	6.7e-05	1.3e-04	1.5e-04	1.5e-05	5.4e-06	1.3e-05	2.5e-05	3.0e-05
Tl-204	6.2e-04	3.0e-04	5.8e-04	9.6e-04	1.1e-03	1.2e-04	6.0e-05	1.2e-04	1.9e-04	2.2e-04
Pb-210	5.9e+00	2.8e+00	5.5e+00	9.1e+00	1.0e+01	1.2e+00	5.6e-01	1.1e+00	1.8e+00	2.0e+00
Bi-207	5.3e-03	2.5e-03	4.9e-03	8.1e-03	9.3e-03	1.0e-03	5.0e-04	9.7e-04	1.6e-03	1.8e-03
Po-210	1.9e+00	8.9e-01	1.8e+00	3.0e+00	3.4e+00	3.8e-01	1.8e-01	3.5e-01	5.8e-01	6.6e-01
Ra-226	1.2e-01	4.9e-02	1.1e-01	1.9e-01	2.2e-01	2.3e-02	9.7e-03	2.1e-02	3.7e-02	4.3e-02
Ra-228	2.1e-01	7.4e-02	1.9e-01	3.7e-01	4.4e-01	4.2e-02	1.5e-02	3.7e-02	7.2e-02	8.6e-02
Ac-227	1.8e+01	7.3e+00	1.6e+01	2.9e+01	3.4e+01	3.5e+00	1.5e+00	3.2e+00	5.6e+00	6.6e+00
Th-228	4.5e+00	1.9e+00	4.1e+00	7.3e+00	8.6e+00	8.9e-01	3.8e-01	8.0e-01	1.4e+00	1.7e+00
Th-229	2.4e+01	9.9e+00	2.1e+01	3.8e+01	4.5e+01	4.6e+00	2.0e+00	4.2e+00	7.5e+00	8.8e+00
Th-230	3.5e+00	1.5e+00	3.2e+00	5.7e+00	6.7e+00	7.0e-01	3.0e-01	6.3e-01	1.1e+00	1.3e+00
Th-232	1.6e+01	6.5e+00	1.4e+01	2.5e+01	3.0e+01	3.1e+00	1.3e+00	2.8e+00	5.0e+00	5.8e+00
Pa-231	1.2e+01	4.8e+00	1.1e+01	1.9e+01	2.2e+01	2.3e+00	9.8e-01	2.1e+00	3.7e+00	4.2e+00
U-232	9.0e+00	3.8e+00	8.3e+00	1.5e+01	1.7e+01	1.8e+00	7.7e-01	1.6e+00	2.9e+00	3.4e+00
U-233	1.8e+00	7.7e-01	1.7e+00	3.0e+00	3.5e+00	3.6e-01	1.5e-01	3.3e-01	5.8e-01	6.8e-01
U-234	1.8e+00	7.5e-01	1.6e+00	2.9e+00	3.4e+00	3.5e-01	1.5e-01	3.2e-01	5.7e-01	6.6e-01
U-235	1.7e+00	7.0e-01	1.5e+00	2.7e+00	3.2e+00	3.3e-01	1.4e-01	3.0e-01	5.3e-01	6.2e-01
U-236	1.7e+00	7.1e-01	1.5e+00	2.7e+00	3.2e+00	3.3e-01	1.4e-01	3.1e-01	5.4e-01	6.3e-01
U-238	1.6e+00	6.7e-01	1.5e+00	2.6e+00	3.0e+00	3.2e-01	1.4e-01	2.9e-01	5.1e-01	5.9e-01
Np-237	7.3e+00	3.0e+00	6.5e+00	1.2e+01	1.4e+01	1.4e+00	6.1e-01	1.3e+00	2.3e+00	2.7e+00
Pu-236	1.7e+00	7.1e-01	1.5e+00	2.8e+00	3.3e+00	3.4e-01	1.4e-01	3.1e-01	5.5e-01	6.4e-01
Pu-238	3.9e+00	1.6e+00	3.5e+00	6.3e+00	7.4e+00	7.7e-01	3.2e-01	7.0e-01	1.2e+00	1.4e+00
Pu-239	4.2e+00	1.7e+00	3.8e+00	6.7e+00	8.0e+00	8.2e-01	3.5e-01	7.5e-01	1.3e+00	1.5e+00
Pu-240	4.2e+00	1.7e+00	3.8e+00	6.7e+00	8.0e+00	8.2e-01	3.5e-01	7.5e-01	1.3e+00	1.5e+00
Pu-241	6.7e-02	2.8e-02	6.1e-02	1.1e-01	1.3e-01	1.3e-02	5.6e-03	1.2e-02	2.1e-02	2.5e-02
Pu-242	4.0e+00	1.6e+00	3.6e+00	6.4e+00	7.6e+00	7.8e-01	3.3e-01	7.1e-01	1.3e+00	1.5e+00
Pu-244	3.9e+00	1.6e+00	3.5e+00	6.3e+00	7.5e+00	7.7e-01	3.2e-01	7.0e-01	1.2e+00	1.4e+00
Am-241	6.0e+00	2.5e+00	5.5e+00	9.7e+00	1.1e+01	1.2e+00	5.0e-01	1.1e+00	1.9e+00	2.2e+00
Am-242m	5.9e+00	2.5e+00	5.4e+00	9.6e+00	1.1e+01	1.2e+00	4.9e-01	1.1e+00	1.9e+00	2.2e+00
Am-243	5.9e+00	2.5e+00	5.4e+00	9.6e+00	1.1e+01	1.2e+00	5.0e-01	1.1e+00	1.9e+00	2.2e+00
Cm-242	2.1e-01	8.5e-02	1.9e-01	3.3e-01	3.9e-01	4.0e-02	1.7e-02	3.7e-02	6.5e-02	7.6e-02
Cm-243	4.1e+00	1.7e+00	3.8e+00	6.7e+00	7.8e+00	8.1e-01	3.5e-01	7.4e-01	1.3e+00	1.5e+00
Cm-244	3.3e+00	1.4e+00	3.0e+00	5.4e+00	6.3e+00	6.6e-01	2.8e-01	6.0e-01	1.1e+00	1.2e+00
Cm-245	6.1e+00	2.6e+00	5.6e+00	1.0e+01	1.2e+01	1.2e+00	5.1e-01	1.1e+00	1.9e+00	2.3e+00
Cm-246	6.1e+00	2.5e+00	5.5e+00	9.9e+00	1.1e+01	1.2e+00	5.1e-01	1.1e+00	1.9e+00	2.3e+00
Cm-247	5.6e+00	2.3e+00	5.1e+00	9.1e+00	1.1e+01	1.1e+00	4.7e-01	1.0e+00	1.8e+00	2.1e+00
Cm-248	2.2e+01	9.3e+00	2.0e+01	3.6e+01	4.2e+01	4.4e+00	1.9e+00	4.0e+00	7.0e+00	8.3e+00
Bk-249	1.8e-02	7.5e-03	1.7e-02	3.0e-02	3.5e-02	3.6e-03	1.5e-03	3.3e-03	5.8e-03	6.8e-03
Cf-248	6.5e-01	2.7e-01	5.9e-01	1.1e+00	1.2e+00	1.3e-01	5.4e-02	1.2e-01	2.1e-01	2.4e-01
Cf-249	5.1e+00	2.1e+00	4.7e+00	8.4e+00	9.7e+00	1.0e+00	4.3e-01	9.2e-01	1.6e+00	1.9e+00
Cf-250	2.8e+00	1.1e+00	2.5e+00	4.5e+00	5.2e+00	5.5e-01	2.3e-01	5.0e-01	8.9e-01	1.0e+00
Cf-251	5.2e+00	2.1e+00	4.8e+00	8.5e+00	9.9e+00	1.0e+00	4.4e-01	9.4e-01	1.7e+00	2.0e+00
Cf-252	2.1e+00	8.5e-01	1.9e+00	3.4e+00	3.9e+00	4.1e-01	1.7e-01	3.7e-01	6.6e-01	7.7e-01
Cf-254	2.7e+00	1.1e+00	2.5e+00	4.5e+00	5.4e+00	5.4e-01	2.2e-01	4.9e-01	8.9e-01	1.1e+00
Es-254	5.2e-01	2.2e-01	4.8e-01	8.4e-01	9.8e-01	1.0e-01	4.3e-02	9.4e-02	1.6e-01	1.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.12 Normalized effective dose equivalents from ingestion: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.1e-03	5.0e-04	4.8e-03	9.6e-03	1.1e-02	1.0e-03	9.9e-05	9.6e-04	1.9e-03	2.1e-03
P-32	8.4e-05	4.1e-06	4.2e-05	1.5e-04	2.0e-04	1.3e-05	8.1e-07	8.3e-06	3.0e-05	3.9e-05
S-35	9.6e-06	8.6e-07	8.3e-06	1.9e-05	2.3e-05	1.9e-06	1.7e-07	1.6e-06	3.8e-06	4.5e-06
Cl-36	6.5e-04	4.9e-05	5.2e-04	1.4e-03	1.7e-03	1.3e-04	9.8e-06	1.0e-04	2.8e-04	3.4e-04
K-40	8.4e-03	8.3e-04	7.9e-03	1.6e-02	1.8e-02	1.7e-03	1.6e-04	1.6e-03	3.1e-03	3.5e-03
Ca-41	5.7e-05	5.3e-06	5.2e-05	1.1e-04	1.3e-04	1.1e-05	1.1e-06	1.0e-05	2.2e-05	2.6e-05
Ca-45	1.2e-04	1.1e-05	1.1e-04	2.4e-04	2.8e-04	2.4e-05	2.3e-06	2.2e-05	4.7e-05	5.5e-05
Sc-46	2.2e-04	2.0e-05	2.0e-04	4.4e-04	5.1e-04	4.4e-05	4.0e-06	3.9e-05	8.5e-05	9.9e-05
Cr-51	1.5e-06	1.2e-07	1.2e-06	3.1e-06	4.0e-06	3.0e-07	2.5e-08	2.4e-07	6.1e-07	7.8e-07
Mn-53	3.6e-06	3.5e-07	3.3e-06	6.7e-06	7.7e-06	7.0e-07	6.9e-08	6.7e-07	1.3e-06	1.5e-06
Mn-54	8.5e-05	8.4e-06	7.9e-05	1.6e-04	1.8e-04	1.7e-05	1.6e-06	1.6e-05	3.1e-05	3.6e-05
Fe-55	7.0e-06	6.2e-07	6.1e-06	1.4e-05	1.7e-05	1.4e-06	1.2e-07	1.2e-06	2.7e-06	3.3e-06
Fe-59	4.9e-05	4.0e-06	4.1e-05	9.9e-05	1.2e-04	9.6e-06	8.1e-07	8.1e-06	1.9e-05	2.3e-05
Co-56	9.0e-05	8.1e-06	7.8e-05	1.8e-04	2.2e-04	1.8e-05	1.6e-06	1.6e-05	3.5e-05	4.3e-05
Co-57	8.1e-06	7.2e-07	7.1e-06	1.6e-05	1.9e-05	1.6e-06	1.5e-07	1.4e-06	3.2e-06	3.8e-06
Co-58	2.6e-05	2.3e-06	2.2e-05	5.2e-05	6.3e-05	5.1e-06	4.7e-07	4.4e-06	1.0e-05	1.2e-05
Co-60	1.2e-04	1.1e-05	1.1e-04	2.4e-04	2.8e-04	2.4e-05	2.2e-06	2.1e-05	4.7e-05	5.6e-05
Ni-59	2.5e-06	2.2e-07	2.2e-06	5.0e-06	5.9e-06	4.9e-07	4.6e-08	4.4e-07	9.8e-07	1.1e-06
Ni-63	6.9e-06	6.1e-07	6.0e-06	1.4e-05	1.6e-05	1.4e-06	1.3e-07	1.2e-06	2.7e-06	3.2e-06
Zn-65	1.1e-02	1.1e-03	1.0e-02	2.1e-02	2.4e-02	2.2e-03	2.2e-04	2.1e-03	4.1e-03	4.6e-03
As-73	1.7e-04	1.5e-05	1.5e-04	3.4e-04	4.1e-04	3.4e-05	2.9e-06	3.0e-05	6.8e-05	8.0e-05
Se-75	7.0e-03	6.7e-04	6.6e-03	1.3e-02	1.5e-02	1.4e-03	1.4e-04	1.3e-03	2.6e-03	2.9e-03
Sr-85	6.3e-05	5.7e-06	5.6e-05	1.2e-04	1.5e-04	1.2e-05	1.1e-06	1.1e-05	2.4e-05	2.9e-05
Sr-89	2.7e-04	2.4e-05	2.4e-04	5.3e-04	6.4e-04	5.3e-05	4.8e-06	4.7e-05	1.1e-04	1.2e-04
Sr-90	6.9e-03	6.4e-04	6.2e-03	1.3e-02	1.6e-02	1.4e-03	1.3e-04	1.2e-03	2.6e-03	3.0e-03
Y-91	3.0e-04	2.6e-05	2.6e-04	5.9e-04	7.0e-04	5.8e-05	5.2e-06	5.2e-05	1.1e-04	1.4e-04
Zr-93	7.5e-05	7.1e-06	6.8e-05	1.4e-04	1.7e-04	1.5e-05	1.4e-06	1.3e-05	2.8e-05	3.3e-05
Zr-95	1.6e-04	1.5e-05	1.5e-04	3.2e-04	3.7e-04	3.2e-05	3.1e-06	3.0e-05	6.2e-05	7.3e-05
Nb-93m	2.3e-05	2.2e-06	2.1e-05	4.5e-05	5.3e-05	4.6e-06	4.5e-07	4.2e-06	8.8e-06	1.0e-05
Nb-94	3.2e-04	3.1e-05	2.9e-04	6.2e-04	7.3e-04	6.3e-05	6.1e-06	5.7e-05	1.2e-04	1.4e-04
Nb-95	8.2e-05	5.3e-06	5.3e-05	1.3e-04	1.5e-04	1.2e-05	1.0e-06	1.0e-05	2.5e-05	3.0e-05
Mo-93	1.6e-05	1.4e-06	1.4e-05	3.2e-05	3.8e-05	3.2e-06	2.9e-07	2.8e-06	6.3e-06	7.4e-06
Tc-97	2.1e-06	1.9e-07	1.8e-06	4.1e-06	4.8e-06	4.0e-07	3.8e-08	3.6e-07	8.1e-07	9.5e-07
Tc-97m	1.2e-05	1.1e-06	1.0e-05	2.3e-05	2.8e-05	2.3e-06	2.1e-07	2.0e-06	4.5e-06	5.4e-06
Tc-99	1.7e-05	1.6e-06	1.5e-05	3.5e-05	4.1e-05	3.4e-06	3.2e-07	3.0e-06	6.9e-06	8.1e-06
Ru-103	2.1e-05	1.8e-06	1.8e-05	4.3e-05	5.2e-05	4.1e-06	3.6e-07	3.5e-06	8.4e-06	1.0e-05
Ru-106	3.1e-04	2.9e-05	2.7e-04	6.1e-04	7.4e-04	6.0e-05	5.7e-06	5.3e-05	1.2e-04	1.4e-04
Ag-108m	1.1e-03	8.2e-05	8.8e-04	2.3e-03	2.7e-03	2.1e-04	1.6e-05	1.7e-04	4.4e-04	5.3e-04
Ag-110m	1.4e-03	1.1e-04	1.1e-03	2.9e-03	3.5e-03	2.8e-04	2.1e-05	2.2e-04	5.7e-04	6.9e-04
Cd-109	1.1e-02	1.1e-03	1.1e-02	2.1e-02	2.5e-02	2.2e-03	2.2e-04	2.2e-03	4.2e-03	4.7e-03
Sn-113	3.2e-05	2.9e-06	2.7e-05	6.4e-05	7.7e-05	6.2e-06	5.7e-07	5.4e-06	1.3e-05	1.5e-05
Sb-124	8.1e-04	6.2e-05	6.5e-04	1.7e-03	2.1e-03	1.6e-04	1.2e-05	1.3e-04	3.4e-04	4.1e-04
Sb-125	4.1e-04	3.1e-05	3.4e-04	8.6e-04	1.1e-03	8.0e-05	6.6e-06	6.7e-05	1.7e-04	2.1e-04
Te-123m	4.1e-03	3.9e-04	3.9e-03	7.8e-03	8.8e-03	8.1e-04	8.1e-05	7.7e-04	1.5e-03	1.7e-03
Te-127m	6.4e-03	6.1e-04	6.0e-03	1.2e-02	1.4e-02	1.3e-03	1.2e-04	1.2e-03	2.4e-03	2.7e-03
I-125	5.8e-03	4.1e-04	4.5e-03	1.3e-02	1.6e-02	1.1e-03	8.3e-05	8.8e-04	2.5e-03	3.1e-03
I-129	6.0e-02	4.4e-03	4.7e-02	1.3e-01	1.6e-01	1.2e-02	8.8e-04	9.4e-03	2.6e-02	3.2e-02
I-131	3.2e-03	2.6e-05	4.7e-04	3.4e-03	5.2e-03	2.5e-04	5.1e-06	9.2e-05	6.7e-04	1.0e-03
Cs-134	6.3e-02	6.2e-03	6.0e-02	1.2e-01	1.4e-01	1.2e-02	1.2e-03	1.2e-02	2.3e-02	2.6e-02
Cs-135	6.3e-03	6.2e-04	6.0e-03	1.2e-02	1.4e-02	1.2e-03	1.2e-04	1.2e-03	2.3e-03	2.6e-03
Cs-137	4.4e-02	4.4e-03	4.2e-02	8.3e-02	9.5e-02	8.7e-03	8.6e-04	8.4e-03	1.6e-02	1.8e-02
Ba-133	1.5e-04	1.4e-05	1.4e-04	2.9e-04	3.4e-04	3.0e-05	2.8e-06	2.7e-05	5.7e-05	6.7e-05
Ce-139	4.4e-05	4.0e-06	3.9e-05	8.5e-05	1.0e-04	8.6e-06	7.8e-07	7.8e-06	1.7e-05	2.0e-05
Ce-141	6.7e-05	5.5e-06	5.6e-05	1.4e-04	1.7e-04	1.3e-05	1.1e-06	1.1e-05	2.7e-05	3.3e-05
Ce-144	8.8e-04	8.2e-05	7.9e-04	1.7e-03	2.0e-03	1.7e-04	1.6e-05	1.6e-04	3.3e-04	3.9e-04
Pm-147	4.6e-05	4.3e-06	4.2e-05	8.9e-05	1.1e-04	9.0e-06	8.6e-07	8.3e-06	1.7e-05	2.0e-05

Table F1.12 Normalized effective dose equivalents from ingestion: Transferring EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-05	1.7e-06	1.6e-05	3.4e-05	3.9e-05	3.4e-06	3.3e-07	3.1e-06	6.6e-06	7.6e-06
Eu-152	2.9e-04	2.8e-05	2.6e-04	5.6e-04	6.5e-04	5.7e-05	5.5e-06	5.2e-05	1.1e-04	1.3e-04
Eu-154	4.2e-04	4.1e-05	3.9e-04	8.2e-04	9.7e-04	8.4e-05	8.1e-06	7.6e-05	1.6e-04	1.9e-04
Eu-155	6.8e-05	6.5e-06	6.1e-05	1.3e-04	1.5e-04	1.3e-05	1.3e-06	1.2e-05	2.5e-05	3.0e-05
Gd-153	4.8e-05	4.4e-06	4.3e-05	9.5e-05	1.1e-04	9.5e-06	8.7e-07	8.6e-06	1.8e-05	2.1e-05
Tb-160	2.2e-04	2.0e-05	2.0e-04	4.3e-04	5.0e-04	4.4e-05	4.0e-06	3.9e-05	8.4e-05	9.8e-05
Tm-170	2.0e-04	1.9e-05	1.8e-04	3.9e-04	4.5e-04	3.9e-05	3.7e-06	3.6e-05	7.7e-05	8.8e-05
Tm-171	1.9e-05	1.8e-06	1.7e-05	3.7e-05	4.2e-05	3.7e-06	3.5e-07	3.3e-06	7.2e-06	8.2e-06
Ta-182	2.4e-04	2.2e-05	2.1e-04	4.7e-04	5.4e-04	4.7e-05	4.4e-06	4.3e-05	9.1e-05	1.1e-04
W-181	2.8e-06	2.6e-07	2.5e-06	5.7e-06	6.7e-06	5.6e-07	5.1e-08	4.9e-07	1.1e-06	1.3e-06
W-185	1.4e-05	1.3e-06	1.2e-05	2.8e-05	3.3e-05	2.8e-06	2.5e-07	2.4e-06	5.5e-06	6.5e-06
Os-185	1.6e-03	1.5e-04	1.5e-03	3.0e-03	3.4e-03	3.1e-04	3.0e-05	2.9e-04	5.8e-04	6.6e-04
Ir-192	5.1e-05	4.7e-06	4.4e-05	1.0e-04	1.2e-04	1.0e-05	9.2e-07	8.7e-06	2.0e-05	2.4e-05
Tl-204	2.9e-03	2.8e-04	2.7e-03	5.4e-03	6.2e-03	5.7e-04	5.6e-05	5.5e-04	1.1e-03	1.2e-03
Pb-210	6.4e+00	6.2e-01	6.0e+00	1.2e+01	1.4e+01	1.3e+00	1.2e-01	1.2e+00	2.3e+00	2.6e+00
Bi-207	4.8e-03	4.7e-04	4.5e-03	9.0e-03	1.0e-02	9.5e-04	9.3e-05	9.1e-04	1.8e-03	2.0e-03
Po-210	1.4e+00	1.4e-01	1.3e+00	2.7e+00	3.0e+00	2.8e-01	2.8e-02	2.7e-01	5.2e-01	5.9e-01
Ra-226	6.0e-02	5.8e-03	5.4e-02	1.2e-01	1.4e-01	1.2e-02	1.1e-03	1.1e-02	2.3e-02	2.7e-02
Ra-228	6.5e-02	6.2e-03	5.9e-02	1.3e-01	1.5e-01	1.3e-02	1.2e-03	1.2e-02	2.5e-02	2.9e-02
Ac-227	6.6e-01	6.1e-02	6.0e-01	1.3e+00	1.5e+00	1.3e-01	1.2e-02	1.2e-01	2.5e-01	2.9e-01
Th-228	3.5e-02	3.3e-03	3.2e-02	6.8e-02	8.0e-02	6.9e-03	6.6e-04	6.3e-03	1.3e-02	1.6e-02
Th-229	1.8e-01	1.7e-02	1.6e-01	3.5e-01	4.1e-01	3.6e-02	3.4e-03	3.3e-02	6.9e-02	8.0e-02
Th-230	2.5e-02	2.3e-03	2.2e-02	4.8e-02	5.6e-02	4.9e-03	4.6e-04	4.5e-03	9.3e-03	1.1e-02
Th-232	1.2e-01	1.2e-02	1.1e-01	2.4e-01	2.8e-01	2.4e-02	2.3e-03	2.2e-02	4.7e-02	5.5e-02
Pa-231	4.8e-01	4.4e-02	4.3e-01	9.4e-01	1.1e+00	9.4e-02	8.7e-03	8.5e-02	1.8e-01	2.1e-01
U-232	4.3e-03	4.2e-04	3.8e-03	8.3e-03	9.7e-03	8.4e-04	8.5e-05	7.7e-04	1.6e-03	1.9e-03
U-233	1.2e-03	1.1e-04	1.1e-03	2.3e-03	2.7e-03	2.4e-04	2.2e-05	2.1e-04	4.5e-04	5.2e-04
U-234	1.2e-03	1.1e-04	1.1e-03	2.3e-03	2.7e-03	2.3e-04	2.2e-05	2.1e-04	4.5e-04	5.2e-04
U-235	1.3e-03	1.2e-04	1.2e-03	2.4e-03	2.9e-03	2.5e-04	2.4e-05	2.3e-04	4.8e-04	5.5e-04
U-236	1.1e-03	1.1e-04	1.0e-03	2.1e-03	2.5e-03	2.2e-04	2.1e-05	2.0e-04	4.2e-04	4.9e-04
U-238	1.7e-03	1.6e-04	1.5e-03	3.2e-03	3.8e-03	3.3e-04	3.2e-05	3.0e-04	6.4e-04	7.4e-04
Np-237	2.0e-01	1.9e-02	1.8e-01	3.8e-01	4.5e-01	3.9e-02	3.6e-03	3.5e-02	7.6e-02	8.9e-02
Pu-236	5.1e-02	5.0e-03	4.6e-02	1.0e-01	1.2e-01	1.0e-02	1.0e-03	9.1e-03	1.9e-02	2.3e-02
Pu-238	1.4e-01	1.4e-02	1.3e-01	2.8e-01	3.3e-01	2.8e-02	2.8e-03	2.5e-02	5.4e-02	6.4e-02
Pu-239	1.6e-01	1.5e-02	1.4e-01	3.1e-01	3.6e-01	3.1e-02	3.1e-03	2.8e-02	6.0e-02	7.1e-02
Pu-240	1.6e-01	1.5e-02	1.4e-01	3.1e-01	3.6e-01	3.1e-02	3.1e-03	2.8e-02	6.0e-02	7.1e-02
Pu-241	3.1e-03	3.0e-04	2.8e-03	6.0e-03	7.1e-03	6.1e-04	6.0e-05	5.5e-04	1.2e-03	1.4e-03
Pu-242	1.5e-01	1.5e-02	1.4e-01	2.9e-01	3.5e-01	3.0e-02	2.9e-03	2.7e-02	5.7e-02	6.7e-02
Pu-244	1.5e-01	1.4e-02	1.3e-01	2.9e-01	3.4e-01	2.9e-02	2.9e-03	2.6e-02	5.7e-02	6.7e-02
Am-241	1.6e-01	1.5e-02	1.5e-01	3.2e-01	3.7e-01	3.2e-02	3.1e-03	2.9e-02	6.2e-02	7.3e-02
Am-242m	1.6e-01	1.5e-02	1.5e-01	3.2e-01	3.7e-01	3.2e-02	3.1e-03	2.9e-02	6.1e-02	7.2e-02
Am-243	1.6e-01	1.5e-02	1.5e-01	3.2e-01	3.7e-01	3.2e-02	3.1e-03	2.9e-02	6.2e-02	7.2e-02
Cm-242	4.6e-03	4.3e-04	4.1e-03	8.9e-03	1.0e-02	9.0e-04	8.7e-05	8.2e-04	1.7e-03	2.0e-03
Cm-243	1.1e-01	1.0e-02	1.0e-01	2.2e-01	2.5e-01	2.2e-02	2.1e-03	2.0e-02	4.2e-02	5.0e-02
Cm-244	9.0e-02	8.4e-03	8.1e-02	1.7e-01	2.0e-01	1.8e-02	1.7e-03	1.6e-02	3.4e-02	4.0e-02
Cm-245	1.7e-01	1.6e-02	1.5e-01	3.3e-01	3.8e-01	3.3e-02	3.2e-03	3.0e-02	6.3e-02	7.4e-02
Cm-246	1.7e-01	1.5e-02	1.5e-01	3.2e-01	3.8e-01	3.3e-02	3.2e-03	3.0e-02	6.3e-02	7.3e-02
Cm-247	1.5e-01	1.4e-02	1.4e-01	3.0e-01	3.5e-01	3.0e-02	2.9e-03	2.7e-02	5.8e-02	6.8e-02
Cm-248	6.1e-01	5.7e-02	5.5e-01	1.2e+00	1.4e+00	1.2e-01	1.2e-02	1.1e-01	2.3e-01	2.7e-01
Bk-249	5.4e-04	5.0e-05	4.9e-04	1.1e-03	1.2e-03	1.1e-04	1.0e-05	9.7e-05	2.0e-04	2.4e-04
Cf-248	1.4e-02	1.4e-03	1.3e-02	2.8e-02	3.3e-02	2.8e-03	2.7e-04	2.6e-03	5.5e-03	6.4e-03
Cf-249	2.1e-01	2.1e-02	1.9e-01	4.1e-01	4.8e-01	4.2e-02	4.0e-03	3.8e-02	8.1e-02	9.4e-02
Cf-250	9.5e-02	9.2e-03	8.6e-02	1.9e-01	2.2e-01	1.9e-02	1.8e-03	1.7e-02	3.6e-02	4.2e-02
Cf-251	2.2e-01	2.1e-02	2.0e-01	4.2e-01	4.9e-01	4.3e-02	4.1e-03	3.9e-02	8.3e-02	9.7e-02
Cf-252	4.8e-02	4.6e-03	4.3e-02	9.2e-02	1.1e-01	9.4e-03	8.9e-04	8.5e-03	1.8e-02	2.1e-02
Cf-254	7.6e-02	7.1e-03	6.6e-02	1.5e-01	1.8e-01	1.5e-02	1.4e-03	1.3e-02	2.9e-02	3.5e-02
Es-254	1.3e-02	1.3e-03	1.2e-02	2.6e-02	3.0e-02	2.6e-03	2.5e-04	2.4e-03	5.1e-03	5.9e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.13 Normalized effective dose equivalents from all pathways: Baghouse maintenance

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e-01	4.0e-02	1.8e-01	6.0e-01	9.0e-01	6.0e-02	7.9e-03	3.5e-02	1.2e-01	1.8e-01
P-32	5.6e-06	4.2e-07	2.7e-06	1.2e-05	1.9e-05	1.1e-06	8.3e-08	5.2e-07	2.3e-06	3.7e-06
S-35	4.6e-06	5.4e-09	2.6e-06	9.4e-06	1.5e-07	9.1e-09	1.7e-09	5.1e-09	1.8e-08	2.9e-08
Cl-36	4.7e-05	4.0e-06	2.5e-05	9.9e-05	1.5e-04	9.3e-06	8.3e-07	4.9e-06	1.9e-05	3.0e-05
K-40	2.2e-02	2.9e-03	1.3e-02	4.3e-02	6.7e-02	4.3e-03	5.9e-04	2.6e-03	8.6e-03	1.3e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.8e-07	3.4e-08	1.6e-07	5.5e-07	8.4e-07	5.4e-08	8.9e-09	3.1e-08	1.1e-07	1.7e-07
Sc-46	2.2e-02	2.7e-03	1.2e-02	4.4e-02	6.7e-02	4.3e-03	5.4e-04	2.5e-03	8.6e-03	1.4e-02
Cr-51	9.1e-05	8.9e-06	4.8e-05	1.8e-04	2.8e-04	1.8e-05	1.8e-06	9.4e-06	3.6e-05	5.6e-05
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.1e-03	1.1e-03	4.7e-03	1.6e-02	2.5e-02	1.6e-03	2.1e-04	9.3e-04	3.1e-03	4.7e-03
Fe-55	3.6e-13	4.2e-14	2.0e-13	7.1e-13	1.1e-12	7.1e-14	8.6e-15	4.0e-14	1.4e-13	2.1e-13
Fe-59	2.7e-03	3.1e-04	1.5e-03	5.5e-03	8.2e-03	5.4e-04	6.1e-05	2.9e-04	1.1e-03	1.6e-03
Co-56	9.7e-03	1.1e-03	5.4e-03	2.0e-02	3.0e-02	1.9e-03	2.3e-04	1.1e-03	3.9e-03	5.9e-03
Co-57	2.5e-04	3.0e-05	1.4e-04	5.1e-04	8.0e-04	5.0e-05	5.9e-06	2.7e-05	1.0e-04	1.5e-04
Co-58	2.7e-03	3.1e-04	1.5e-03	5.4e-03	8.3e-03	5.2e-04	6.1e-05	2.9e-04	1.1e-03	1.6e-03
Co-60	9.2e-03	1.1e-03	5.1e-03	1.9e-02	2.8e-02	1.8e-03	2.1e-04	1.0e-03	3.7e-03	5.6e-03
Ni-59	5.9e-08	6.9e-09	3.3e-08	1.2e-07	1.8e-07	1.2e-08	1.4e-09	6.5e-09	2.3e-08	3.6e-08
Ni-63	1.0e-09	1.2e-10	5.6e-10	2.0e-09	3.1e-09	2.0e-10	2.3e-11	1.1e-10	4.0e-10	6.2e-10
Zn-65	1.4e-01	1.9e-02	8.2e-02	2.7e-01	4.2e-01	2.8e-02	3.7e-03	1.6e-02	5.5e-02	8.3e-02
As-73	2.2e-04	2.6e-05	1.3e-04	4.5e-04	6.9e-04	4.4e-05	5.3e-06	2.5e-05	8.8e-05	1.3e-04
Se-75	7.0e-02	9.2e-03	4.1e-02	1.4e-01	2.1e-01	1.4e-02	1.8e-03	8.0e-03	2.7e-02	4.1e-02
Sr-85	4.8e-03	5.9e-04	2.7e-03	9.8e-03	1.5e-02	9.5e-04	1.2e-04	5.4e-04	1.9e-03	2.9e-03
Sr-89	1.7e-05	2.1e-06	9.6e-06	3.5e-05	5.3e-05	3.4e-06	4.1e-07	1.9e-06	6.9e-06	1.0e-05
Sr-90	7.2e-05	9.0e-06	4.1e-05	1.4e-04	2.2e-04	1.4e-05	1.8e-06	8.1e-06	2.8e-05	4.3e-05
Y-91	5.5e-05	6.6e-06	3.0e-05	1.1e-04	1.6e-04	1.1e-05	1.3e-06	6.0e-06	2.2e-05	3.2e-05
Zr-93	1.1e-08	1.3e-09	6.3e-09	2.3e-08	3.7e-08	2.2e-09	2.5e-10	1.2e-09	4.4e-09	7.2e-09
Zr-95	1.1e-02	1.4e-03	6.6e-03	2.3e-02	3.5e-02	2.3e-03	2.7e-04	1.3e-03	4.5e-03	7.1e-03
Nb-93m	1.8e-06	2.2e-07	1.0e-06	3.7e-06	5.5e-06	3.6e-07	4.5e-08	2.1e-07	7.1e-07	1.1e-06
Nb-94	2.2e-02	2.8e-03	1.3e-02	4.5e-02	6.8e-02	4.3e-03	5.5e-04	2.5e-03	8.8e-03	1.3e-02
Nb-95	5.9e-03	6.6e-04	3.2e-03	1.1e-02	1.8e-02	1.2e-03	1.3e-04	6.4e-04	2.3e-03	3.5e-03
Mo-93	2.6e-06	3.1e-07	1.5e-06	5.3e-06	8.3e-06	5.2e-07	6.1e-08	2.9e-07	1.0e-06	1.6e-06
Tc-97	3.3e-06	3.8e-07	1.9e-06	6.7e-06	1.1e-05	6.5e-07	7.5e-08	3.7e-07	1.3e-06	2.1e-06
Tc-97m	3.0e-06	3.3e-07	1.7e-06	6.0e-06	9.6e-06	5.9e-07	6.8e-08	3.3e-07	1.2e-06	1.9e-06
Tc-99	1.5e-07	1.8e-08	8.6e-08	3.1e-07	4.9e-07	3.0e-08	3.5e-09	1.7e-08	6.1e-08	9.5e-08
Ru-103	1.0e-03	1.2e-04	5.6e-04	2.1e-03	3.2e-03	2.0e-04	2.3e-05	1.1e-04	4.2e-04	6.3e-04
Ru-106	7.6e-04	9.1e-05	4.3e-04	1.5e-03	2.4e-03	1.5e-04	1.8e-05	8.5e-05	3.0e-04	4.7e-04
Ag-108m	2.1e-02	7.0e-03	3.8e-02	1.4e-01	2.3e-01	7.4e-02	1.4e-03	2.7e-03	2.8e-02	4.5e-02
Ag-110m	1.1e-01	1.1e-02	6.0e-02	2.3e-01	3.6e-01	2.2e-02	2.2e-03	1.2e-02	4.4e-02	7.0e-02
Cd-109	1.5e-03	2.0e-04	8.7e-04	3.0e-03	4.5e-03	3.0e-04	4.0e-05	1.7e-04	5.8e-04	8.8e-04
Sn-113	7.6e-04	8.9e-05	4.2e-04	1.5e-03	2.4e-03	1.5e-04	1.8e-05	8.3e-05	3.0e-04	4.6e-04
Sb-124	4.6e-02	4.5e-03	2.4e-02	9.3e-02	1.5e-01	9.0e-03	8.9e-04	4.9e-03	1.8e-02	3.0e-02
Sb-125	1.5e-02	1.4e-03	7.9e-03	3.0e-02	4.9e-02	2.9e-03	2.9e-04	1.6e-03	5.8e-03	9.5e-03
Te-123m	2.2e-02	2.9e-03	1.3e-02	4.3e-02	6.5e-02	4.3e-03	5.7e-04	2.5e-03	8.5e-03	1.3e-02
Te-127m	1.8e-03	2.3e-04	1.0e-03	3.5e-03	5.3e-03	3.5e-04	4.7e-05	2.0e-04	6.9e-04	1.0e-03
I-125	5.4e-04	4.6e-05	2.9e-04	1.2e-03	1.8e-03	1.1e-04	9.2e-06	5.6e-05	2.2e-04	3.5e-04
I-129	5.5e-04	4.7e-05	2.9e-04	1.1e-03	1.8e-03	1.1e-04	9.3e-06	5.8e-05	2.2e-04	3.4e-04
I-131	2.5e-03	5.6e-05	7.3e-04	5.5e-03	9.6e-03	5.0e-04	1.1e-05	1.4e-04	1.1e-03	1.9e-03
Cs-134	4.2e-01	5.7e-02	2.5e-01	8.4e-01	1.3e+00	8.3e-02	1.1e-02	4.9e-02	1.6e-01	2.5e-01
Cs-135	1.4e-05	1.8e-06	7.9e-06	2.7e-05	4.1e-05	2.7e-06	3.7e-07	1.6e-06	5.2e-06	8.0e-06
Cs-137	1.6e-01	2.1e-02	9.1e-02	3.1e-01	4.7e-01	3.1e-02	4.2e-03	1.8e-02	6.0e-02	9.2e-02
Ba-133	4.6e-03	5.7e-04	2.7e-03	9.2e-03	1.4e-02	9.1e-04	1.1e-04	5.2e-04	1.8e-03	2.8e-03
Ce-139	1.2e-03	1.5e-04	6.8e-04	2.5e-03	3.8e-03	2.4e-04	2.9e-05	1.4e-04	5.0e-04	7.5e-04
Ce-141	3.5e-04	3.9e-05	1.9e-04	7.3e-04	1.1e-03	7.0e-05	7.9e-06	3.8e-05	1.4e-04	2.2e-04
Ce-144	6.2e-04	7.4e-05	3.5e-04	1.2e-03	1.9e-03	1.2e-04	1.5e-05	6.9e-05	2.5e-04	3.8e-04
Pm-147	2.2e-07	2.8e-08	1.3e-07	4.4e-07	7.0e-07	4.4e-08	5.5e-09	2.5e-08	8.8e-08	1.3e-07

Table F1.13 Normalized effective dose equivalents from all pathways: Baghouse maintenance

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-08	2.4e-09	1.1e-08	3.9e-08	6.0e-08	3.9e-09	4.9e-10	2.2e-09	7.6e-09	1.2e-08
Eu-152	1.6e-02	1.9e-03	9.0e-03	3.2e-02	4.9e-02	3.1e-03	3.9e-04	1.8e-03	6.3e-03	9.5e-03
Eu-154	1.6e-02	1.8e-03	8.7e-03	3.1e-02	4.8e-02	3.1e-03	3.8e-04	1.7e-03	6.1e-03	9.3e-03
Eu-155	4.7e-04	5.6e-05	2.6e-04	9.4e-04	1.4e-03	9.1e-05	1.1e-05	5.2e-05	1.8e-04	2.8e-04
Gd-153	7.1e-04	8.6e-05	4.0e-04	1.4e-03	2.2e-03	1.4e-04	1.8e-05	8.0e-05	2.8e-04	4.3e-04
Tb-160	1.2e-02	1.4e-03	6.4e-03	2.3e-02	3.5e-02	2.3e-03	2.8e-04	1.3e-03	4.6e-03	7.0e-03
Tm-170	3.1e-05	3.9e-06	1.8e-05	6.1e-05	9.4e-05	6.1e-06	7.7e-07	3.5e-06	1.2e-05	1.9e-05
Tm-171	4.2e-06	5.3e-07	2.4e-06	8.4e-06	1.3e-05	8.3e-07	1.1e-07	4.7e-07	1.6e-06	2.6e-06
Ta-182	1.5e-02	1.8e-03	8.1e-03	2.9e-02	4.3e-02	2.9e-03	3.5e-04	1.6e-03	5.7e-03	8.6e-03
W-181	6.3e-05	7.4e-06	3.5e-05	1.2e-04	2.0e-04	1.2e-05	1.5e-06	6.9e-06	2.4e-05	3.8e-05
W-185	2.8e-07	3.3e-08	1.6e-07	5.5e-07	8.8e-07	5.6e-08	6.5e-09	3.1e-08	1.1e-07	1.7e-07
Os-185	1.5e-01	1.9e-02	8.5e-02	2.9e-01	4.4e-01	2.9e-02	3.9e-03	1.7e-02	5.7e-02	8.6e-02
Ir-192	2.1e-03	2.4e-04	1.2e-03	4.2e-03	6.5e-03	4.1e-04	4.9e-05	2.3e-04	8.3e-04	1.3e-03
Tl-204	2.5e-04	3.4e-05	1.5e-04	5.0e-04	7.7e-04	5.0e-05	6.8e-06	2.9e-05	9.8e-05	1.5e-04
Pb-210	5.1e-04	6.8e-05	3.0e-04	1.0e-03	1.5e-03	1.0e-04	1.4e-05	5.8e-05	2.0e-04	3.0e-04
Bi-207	4.1e-01	5.5e-02	2.4e-01	8.1e-01	1.2e+00	8.1e-02	1.1e-02	4.7e-02	1.6e-01	2.4e-01
Po-210	2.3e-06	3.0e-07	1.3e-06	4.5e-06	6.8e-06	4.5e-07	6.1e-08	2.7e-07	9.0e-07	1.4e-06
Ra-226	2.4e-02	2.9e-03	1.4e-02	4.8e-02	7.2e-02	4.7e-03	5.8e-04	2.7e-03	9.5e-03	1.4e-02
Ra-228	1.3e-02	1.5e-03	7.1e-03	2.5e-02	3.8e-02	2.5e-03	3.0e-04	1.4e-03	4.9e-03	7.5e-03
Ac-227	4.9e-03	6.1e-04	2.9e-03	9.8e-03	1.5e-02	9.5e-04	1.2e-04	5.6e-04	1.9e-03	2.9e-03
Th-228	1.8e-02	2.3e-03	1.0e-02	3.6e-02	5.8e-02	3.6e-03	4.5e-04	2.1e-03	7.2e-03	1.1e-02
Th-229	3.6e-03	4.5e-04	2.0e-03	7.1e-03	1.1e-02	7.1e-04	8.9e-05	4.0e-04	1.4e-03	2.2e-03
Th-230	4.9e-06	6.0e-07	2.8e-06	9.6e-06	1.6e-05	9.6e-07	1.2e-07	5.5e-07	1.9e-06	3.0e-06
Th-232	1.4e-04	1.3e-05	7.2e-05	2.8e-04	4.4e-04	2.7e-05	2.5e-06	1.4e-05	5.4e-05	8.4e-05
Pa-231	4.2e-04	5.2e-05	2.4e-04	8.4e-04	1.3e-03	8.3e-05	1.1e-05	4.8e-05	1.6e-04	2.6e-04
U-232	6.1e-04	5.8e-05	3.3e-04	1.3e-03	2.1e-03	1.2e-04	1.2e-05	6.4e-05	2.5e-04	4.1e-04
U-233	3.1e-06	3.9e-07	1.8e-06	6.1e-06	1.0e-05	6.1e-07	7.8e-08	3.6e-07	1.2e-06	2.0e-06
U-234	2.2e-06	2.8e-07	1.3e-06	4.4e-06	7.1e-06	4.4e-07	5.5e-08	2.5e-07	8.5e-07	1.4e-06
U-235	2.0e-03	2.5e-04	1.1e-03	3.9e-03	6.3e-03	3.9e-04	4.9e-05	2.2e-04	7.6e-04	1.3e-03
U-236	1.6e-06	2.0e-07	9.2e-07	3.2e-06	5.1e-06	3.2e-07	4.0e-08	1.8e-07	6.2e-07	1.0e-06
U-238	3.8e-04	4.8e-05	2.2e-04	7.5e-04	1.2e-03	7.5e-05	9.6e-06	4.4e-05	1.5e-04	2.4e-04
Np-237	2.7e-03	3.3e-04	1.5e-03	5.4e-03	8.4e-03	5.3e-04	6.5e-05	3.0e-04	1.1e-03	1.6e-03
Pu-236	2.4e-06	2.9e-07	1.4e-06	4.8e-06	7.5e-06	4.7e-07	5.8e-08	2.7e-07	9.3e-07	1.5e-06
Pu-238	1.8e-06	2.1e-07	1.0e-06	3.6e-06	5.6e-06	3.5e-07	4.3e-08	2.0e-07	7.0e-07	1.1e-06
Pu-239	1.4e-06	1.6e-07	7.9e-07	2.7e-06	4.3e-06	2.7e-07	3.3e-08	1.6e-07	5.4e-07	8.5e-07
Pu-240	1.7e-06	2.0e-07	9.8e-07	3.4e-06	5.3e-06	3.4e-07	4.1e-08	1.9e-07	6.7e-07	1.1e-06
Pu-241	3.8e-08	4.2e-09	2.1e-08	7.6e-08	1.2e-07	7.4e-09	8.4e-10	4.2e-09	1.5e-08	2.4e-08
Pu-242	1.4e-06	1.7e-07	8.2e-07	2.9e-06	4.5e-06	2.8e-07	3.4e-08	1.6e-07	5.6e-07	8.8e-07
Pu-244	4.5e-03	5.4e-04	2.6e-03	9.0e-03	1.4e-02	8.9e-04	1.1e-04	5.1e-04	1.8e-03	2.8e-03
Am-241	1.7e-04	2.2e-05	1.0e-04	3.6e-04	5.5e-04	3.4e-05	4.3e-06	2.0e-05	7.0e-05	1.1e-04
Am-242m	1.6e-04	2.0e-05	9.4e-05	3.3e-04	5.2e-04	3.2e-05	4.0e-06	1.9e-05	6.6e-05	1.0e-04
Am-243	2.2e-03	2.7e-04	1.2e-03	4.4e-03	6.8e-03	4.2e-04	5.3e-05	2.4e-04	8.7e-04	1.3e-03
Cm-242	1.8e-06	2.2e-07	1.0e-06	3.6e-06	5.3e-06	3.5e-07	4.5e-08	2.0e-07	7.1e-07	1.1e-06
Cm-243	1.3e-03	1.5e-04	7.3e-04	2.5e-03	3.8e-03	2.5e-04	3.1e-05	1.4e-04	5.0e-04	7.5e-04
Cm-244	1.7e-06	2.2e-07	9.9e-07	3.5e-06	5.2e-06	3.4e-07	4.3e-08	2.0e-07	6.8e-07	1.0e-06
Cm-245	8.2e-04	1.0e-04	4.7e-04	1.6e-03	2.5e-03	1.6e-04	2.0e-05	9.3e-05	3.3e-04	4.9e-04
Cm-246	1.4e-06	1.7e-07	7.8e-07	2.7e-06	4.1e-06	2.7e-07	3.4e-08	1.5e-07	5.4e-07	8.1e-07
Cm-247	4.3e-03	5.4e-04	2.5e-03	8.6e-03	1.3e-02	8.5e-04	1.1e-04	4.9e-04	1.7e-03	2.6e-03
Cm-248	1.3e-06	1.6e-07	7.2e-07	2.5e-06	3.8e-06	2.5e-07	3.1e-08	1.4e-07	5.0e-07	7.5e-07
Bk-249	7.6e-07	7.4e-08	4.1e-07	1.6e-06	2.4e-06	1.5e-07	1.5e-08	8.1e-08	3.1e-07	4.7e-07
Cf-248	1.9e-06	2.3e-07	1.1e-06	3.8e-06	5.8e-06	3.8e-07	4.5e-08	2.1e-07	7.5e-07	1.1e-06
Cf-249	4.2e-03	5.0e-04	2.4e-03	8.3e-03	1.3e-02	8.2e-04	1.0e-04	4.7e-04	1.6e-03	2.5e-03
Cf-250	1.5e-06	1.8e-07	8.7e-07	3.0e-06	4.7e-06	3.0e-07	3.7e-08	1.7e-07	5.9e-07	9.1e-07
Cf-251	1.1e-03	1.3e-04	6.2e-04	2.2e-03	3.3e-03	2.1e-04	2.6e-05	1.2e-04	4.2e-04	6.5e-04
Cf-252	1.7e-06	2.0e-07	9.4e-07	3.3e-06	5.0e-06	3.3e-07	4.0e-08	1.9e-07	6.5e-07	9.9e-07
Cf-254	1.7e-01	2.0e-02	9.8e-02	3.5e-01	5.2e-01	3.4e-02	4.0e-03	1.9e-02	6.7e-02	1.0e-01
Es-254	1.2e-02	1.4e-03	6.7e-03	2.3e-02	3.6e-02	2.3e-03	2.9e-04	1.3e-03	4.6e-03	7.1e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.14 Normalized effective dose equivalents from all pathways: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.1e-06	4.3e-08	2.7e-07	2.2e-06	5.4e-06	2.2e-07	8.7e-09	5.4e-08	4.4e-07	1.1e-06
C-14	4.7e-04	9.7e-06	7.4e-05	8.9e-04	2.5e-03	9.2e-05	1.9e-06	1.5e-05	1.7e-04	4.9e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	2.4e-04	8.8e-06	5.3e-05	4.7e-04	1.1e-03	4.8e-05	1.8e-06	1.1e-05	9.4e-05	2.1e-04
S-35	9.1e-06	3.3e-07	2.2e-06	1.8e-05	4.3e-05	1.8e-06	6.6e-08	4.4e-07	3.7e-06	8.4e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.9e-03	1.1e-04	7.7e-04	9.3e-03	2.4e-02	9.6e-04	2.3e-05	1.5e-04	1.9e-03	4.9e-03
Mn-53	3.7e-05	1.9e-07	1.3e-06	7.9e-05	2.4e-04	7.4e-06	3.7e-08	2.5e-07	1.6e-05	4.8e-05
Mn-54	2.0e-01	7.9e-04	6.5e-03	3.9e-01	1.2e+00	4.0e-02	1.6e-04	1.3e-03	7.8e-02	2.4e-01
Fe-55	1.9e-04	7.0e-06	4.3e-05	3.8e-04	9.8e-04	3.7e-05	1.4e-06	8.6e-06	7.5e-05	1.9e-04
Fe-59	2.5e-01	8.0e-03	5.4e-02	5.0e-01	1.2e+00	4.9e-02	1.6e-03	1.1e-02	1.0e-01	2.4e-01
Co-56	8.7e-01	2.8e-02	1.9e-01	1.8e+00	4.3e+00	1.7e-01	5.6e-03	3.8e-02	3.6e-01	8.4e-01
Co-57	1.7e-02	5.7e-04	3.9e-03	3.6e-02	8.7e-02	3.5e-03	1.1e-04	7.8e-04	7.3e-03	1.7e-02
Co-58	2.5e-01	8.2e-03	5.6e-02	5.2e-01	1.3e+00	5.0e-02	1.6e-03	1.1e-02	1.0e-01	2.5e-01
Co-60	8.2e-01	2.6e-02	1.8e-01	1.7e+00	4.0e+00	1.6e-01	5.1e-03	3.6e-02	3.4e-01	7.9e-01
Ni-59	1.2e-04	5.1e-06	2.9e-05	2.5e-04	6.2e-04	2.4e-05	1.0e-06	5.7e-06	5.0e-05	1.2e-04
Ni-63	2.9e-04	1.2e-05	6.9e-05	6.0e-04	1.5e-03	5.7e-05	2.4e-06	1.4e-05	1.2e-04	2.9e-04
Zn-65	5.1e-03	2.9e-04	2.2e-03	1.2e-02	2.0e-02	1.0e-03	5.7e-05	4.3e-04	2.4e-03	3.9e-03
As-73	2.2e-04	1.1e-05	5.4e-05	4.6e-04	1.1e-03	4.3e-05	2.1e-06	1.1e-05	9.0e-05	2.2e-04
Se-75	8.4e-02	1.3e-04	8.9e-04	1.3e-01	4.0e-01	1.3e-02	2.6e-05	1.8e-04	2.5e-02	7.8e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.9e-03	7.8e-05	4.5e-04	4.0e-03	1.0e-02	3.8e-04	1.6e-05	8.9e-05	8.0e-04	2.0e-03
Tc-97	9.9e-05	4.1e-06	2.3e-05	2.1e-04	5.0e-04	2.0e-05	8.1e-07	4.6e-06	4.0e-05	1.0e-04
Tc-97m	4.4e-04	1.9e-05	1.0e-04	9.3e-04	2.3e-03	8.7e-05	3.8e-06	2.1e-05	1.8e-04	4.5e-04
Tc-99	7.8e-04	3.2e-05	1.8e-04	1.6e-03	4.0e-03	1.5e-04	6.3e-06	3.6e-05	3.2e-04	7.8e-04
Ru-103	1.1e-01	3.5e-03	2.3e-02	2.1e-01	5.1e-01	2.1e-02	7.0e-04	4.6e-03	4.2e-02	1.0e-01
Ru-106	1.1e-01	4.3e-03	2.5e-02	2.4e-01	5.6e-01	2.1e-02	8.5e-04	5.0e-03	4.6e-02	1.1e-01
Ag-108m	5.5e-01	1.6e-02	1.1e-01	1.1e+00	2.8e+00	1.1e-01	3.1e-03	2.2e-02	2.2e-01	5.3e-01
Ag-110m	8.3e-01	2.4e-02	1.7e-01	1.7e+00	4.2e+00	1.6e-01	4.7e-03	3.3e-02	3.3e-01	8.2e-01
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	7.6e-02	2.4e-03	1.7e-02	1.6e-01	3.7e-01	1.5e-02	4.8e-04	3.4e-03	3.1e-02	7.2e-02
Sb-124	1.0e-01	3.1e-03	5.1e-02	2.2e-01	3.3e-01	2.0e-02	6.1e-04	1.0e-02	4.3e-02	6.5e-02
Sb-125	3.3e-02	1.0e-03	1.7e-02	7.3e-02	1.1e-01	6.6e-03	2.0e-04	3.4e-03	1.4e-02	2.1e-02
Te-123m	7.8e-03	3.6e-05	2.4e-04	1.5e-02	4.7e-02	1.5e-03	7.2e-06	4.8e-05	3.1e-03	9.2e-03
Te-127m	1.2e-03	7.4e-06	4.0e-05	2.6e-03	7.9e-03	2.4e-04	1.5e-06	7.9e-06	5.1e-04	1.6e-03
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.14 Normalized effective dose equivalents from all pathways: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	9.2e-04	3.1e-05	2.1e-04	1.9e-03	4.6e-03	1.8e-04	6.2e-06	4.1e-05	3.8e-04	8.9e-04
W-185	2.9e-04	1.0e-05	6.8e-05	5.9e-04	1.4e-03	5.8e-05	2.0e-06	1.3e-05	1.2e-04	2.8e-04
Os-185	6.3e-03	2.5e-04	1.5e-03	1.3e-02	2.9e-02	1.2e-03	5.0e-05	3.0e-04	2.5e-03	5.7e-03
Ir-192	2.1e-01	6.8e-03	4.7e-02	4.4e-01	1.0e+00	4.2e-02	1.4e-03	9.3e-03	8.7e-02	2.0e-01
Tl-204	4.6e-05	1.7e-06	9.4e-06	9.1e-05	2.4e-04	9.1e-06	3.4e-07	1.9e-06	1.8e-05	4.6e-05
Pb-210	1.2e-01	4.5e-03	2.4e-02	2.4e-01	6.2e-01	2.4e-02	9.0e-04	4.8e-03	4.7e-02	1.2e-01
Bi-207	1.7e-02	6.6e-04	4.1e-03	3.5e-02	8.3e-02	3.5e-03	1.3e-04	8.2e-04	7.0e-03	1.6e-02
Po-210	7.4e-03	0.0e+00	3.7e-03	1.6e-02	2.5e-02	1.4e-03	0.0e+00	7.3e-04	3.2e-03	4.9e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.15 Normalized effective dose equivalents from external exposure: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.0e-06	2.1e-08	1.6e-07	2.0e-06	5.4e-06	2.0e-07	4.1e-09	3.1e-08	4.0e-07	1.1e-06
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.2e-04	3.5e-06	2.6e-05	2.4e-04	5.5e-04	2.4e-05	7.1e-07	5.1e-06	4.7e-05	1.1e-04
S-35	1.0e-07	3.9e-09	2.5e-08	2.1e-07	4.9e-07	2.0e-08	7.8e-10	4.9e-09	4.2e-08	9.6e-08
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.8e-03	1.1e-04	7.7e-04	9.2e-03	2.4e-02	9.6e-04	2.2e-05	1.5e-04	1.9e-03	4.8e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.0e-01	7.8e-04	8.5e-03	3.9e-01	1.2e+00	4.0e-02	1.6e-04	1.3e-03	7.8e-02	2.4e-01
Fe-55	2.4e-11	7.3e-13	5.3e-12	4.9e-11	1.2e-10	4.8e-12	1.5e-13	1.0e-12	9.9e-12	2.3e-11
Fe-59	2.5e-01	7.9e-03	5.3e-02	4.9e-01	1.2e+00	4.9e-02	1.6e-03	1.1e-02	9.9e-02	2.4e-01
Co-56	8.7e-01	2.8e-02	1.9e-01	1.8e+00	4.3e+00	1.7e-01	5.6e-03	3.8e-02	3.6e-01	8.4e-01
Co-57	1.7e-02	5.2e-04	3.8e-03	3.5e-02	8.3e-02	3.3e-03	1.0e-04	7.4e-04	7.0e-03	1.6e-02
Co-58	2.5e-01	8.1e-03	5.6e-02	5.2e-01	1.2e+00	5.0e-02	1.6e-03	1.1e-02	1.0e-01	2.4e-01
Co-60	8.1e-01	2.5e-02	1.8e-01	1.7e+00	3.9e+00	1.6e-01	4.9e-03	3.6e-02	3.3e-01	7.7e-01
Ni-59	5.7e-06	1.7e-07	1.3e-06	1.2e-05	2.8e-05	1.1e-06	3.5e-08	2.5e-07	2.3e-06	5.4e-06
Ni-63	1.2e-08	3.7e-10	2.7e-09	2.5e-08	5.9e-08	2.4e-09	7.3e-11	5.3e-10	4.9e-09	1.1e-08
Zn-65	5.0e-03	2.7e-04	2.1e-03	1.2e-02	1.9e-02	9.9e-04	5.4e-05	4.2e-04	2.3e-03	3.8e-03
As-73	5.6e-05	1.9e-06	1.3e-05	1.1e-04	2.7e-04	1.1e-05	3.9e-07	2.5e-06	2.3e-05	5.1e-05
Se-75	8.3e-02	1.2e-04	8.7e-04	1.2e-01	3.9e-01	1.2e-02	2.4e-05	1.7e-04	2.4e-02	7.6e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	8.7e-06	2.1e-07	1.5e-06	1.4e-05	3.3e-05	1.3e-06	4.1e-08	2.9e-07	2.7e-06	6.3e-06
Tc-97	8.6e-06	2.7e-07	1.9e-06	1.8e-05	4.2e-05	1.7e-06	5.3e-08	3.8e-07	3.5e-06	8.2e-06
Tc-97m	3.0e-05	9.5e-07	6.7e-06	6.2e-05	1.5e-04	5.9e-06	1.9e-07	1.3e-06	1.2e-05	2.9e-05
Tc-99	1.5e-05	4.7e-07	3.4e-06	3.1e-05	7.4e-05	3.0e-06	9.3e-08	6.7e-07	6.2e-06	1.4e-05
Ru-103	1.1e-01	3.5e-03	2.3e-02	2.1e-01	5.1e-01	2.1e-02	6.9e-04	4.5e-03	4.2e-02	1.0e-01
Ru-106	7.7e-02	2.4e-03	1.7e-02	1.6e-01	3.8e-01	1.5e-02	4.8e-04	3.4e-03	3.2e-02	7.4e-02
Ag-108m	5.4e-01	1.5e-02	1.1e-01	1.1e+00	2.7e+00	1.1e-01	3.0e-03	2.2e-02	2.2e-01	5.3e-01
Ag-110m	8.2e-01	2.4e-02	1.6e-01	1.6e+00	4.1e+00	1.6e-01	4.6e-03	3.3e-02	3.3e-01	8.1e-01
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	7.5e-02	2.3e-03	1.7e-02	1.5e-01	3.7e-01	1.5e-02	4.7e-04	3.3e-03	3.1e-02	7.1e-02
Sb-124	1.0e-01	3.0e-03	5.1e-02	2.2e-01	3.3e-01	2.0e-02	6.0e-04	1.0e-02	4.3e-02	6.4e-02
Sb-125	3.3e-02	1.0e-03	1.7e-02	7.2e-02	1.1e-01	6.5e-03	2.0e-04	3.3e-03	1.4e-02	2.1e-02
Te-123m	7.3e-03	3.2e-05	2.3e-04	1.4e-02	4.4e-02	1.5e-03	6.3e-06	4.6e-05	2.8e-03	8.6e-03
Te-127m	4.8e-04	2.1e-06	1.5e-05	9.2e-04	2.8e-03	9.4e-05	4.1e-07	3.0e-06	1.8e-04	5.6e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.15 Normalized effective dose equivalents from external exposure: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	8.7e-04	2.7e-05	1.9e-04	1.8e-03	4.3e-03	1.7e-04	5.5e-06	3.8e-05	3.6e-04	8.3e-04
W-185	3.2e-05	1.0e-06	7.2e-06	6.6e-05	1.6e-04	6.4e-06	2.1e-07	1.4e-06	1.3e-05	3.1e-05
Os-185	6.3e-03	2.5e-04	1.5e-03	1.3e-02	2.9e-02	1.2e-03	4.9e-05	3.0e-04	2.5e-03	5.7e-03
Ir-192	2.1e-01	6.7e-03	4.7e-02	4.3e-01	1.0e+00	4.2e-02	1.3e-03	9.2e-03	8.6e-02	2.0e-01
Tl-204	1.2e-05	3.6e-07	2.4e-06	2.4e-05	6.0e-05	2.4e-06	7.1e-08	4.7e-07	4.8e-06	1.2e-05
Pb-210	2.7e-05	7.9e-07	5.3e-06	5.4e-05	1.4e-04	5.4e-06	1.6e-07	1.0e-06	1.1e-05	2.6e-05
Bi-207	1.7e-02	6.5e-04	4.1e-03	3.5e-02	8.3e-02	3.4e-03	1.3e-04	8.1e-04	7.0e-03	1.6e-02
Po-210	2.8e-08	0.0e+00	1.3e-08	6.3e-08	9.8e-08	5.5e-09	0.0e+00	2.6e-09	1.2e-08	1.9e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.16 Normalized effective dose equivalents from inhalation: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	2.6e-07	1.3e-08	6.5e-08	5.5e-07	1.3e-06	5.1e-08	2.6e-09	1.3e-08	1.1e-07	2.6e-07
C-14	1.1e-04	2.9e-06	1.8e-05	2.3e-04	6.2e-04	2.2e-05	5.7e-07	3.5e-06	4.5e-05	1.2e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	2.0e-05	7.8e-07	4.6e-06	4.1e-05	9.4e-05	4.0e-06	1.6e-07	9.1e-07	8.0e-06	1.9e-05
S-35	1.5e-06	8.0e-08	3.9e-07	3.3e-06	7.8e-06	3.0e-07	1.6e-08	7.6e-08	6.5e-07	1.5e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	8.7e-06	2.8e-07	1.4e-06	1.8e-05	4.8e-05	1.7e-06	5.5e-08	2.8e-07	3.5e-06	9.6e-06
Mn-53	2.2e-05	1.1e-07	7.2e-07	4.6e-05	1.4e-04	4.3e-06	2.2e-08	1.4e-07	8.9e-06	2.8e-05
Mn-54	2.7e-04	1.4e-06	9.1e-06	5.8e-04	1.8e-03	5.4e-05	2.8e-07	1.8e-06	1.1e-04	3.6e-04
Fe-55	7.6e-05	3.0e-06	1.7e-05	1.6e-04	4.0e-04	1.5e-05	6.0e-07	3.4e-06	3.1e-05	7.9e-05
Fe-59	4.5e-04	1.9e-05	1.0e-04	9.6e-04	2.4e-03	8.9e-05	3.9e-06	2.0e-05	1.9e-04	4.7e-04
Co-56	1.8e-03	7.5e-05	4.1e-04	3.8e-03	9.2e-03	3.5e-04	1.5e-05	8.2e-05	7.4e-04	1.8e-03
Co-57	4.9e-04	2.0e-05	1.1e-04	1.0e-03	2.6e-03	9.6e-05	4.0e-06	2.2e-05	2.0e-04	5.1e-04
Co-58	4.7e-04	2.0e-05	1.1e-04	1.0e-03	2.5e-03	9.4e-05	4.1e-06	2.2e-05	2.0e-04	4.9e-04
Co-60	1.3e-02	5.1e-04	2.9e-03	2.7e-02	6.7e-02	2.5e-03	1.0e-04	5.8e-04	5.2e-03	1.3e-02
Ni-59	7.7e-05	3.1e-06	1.8e-05	1.7e-04	4.1e-04	1.5e-05	6.2e-07	3.5e-06	3.2e-05	8.0e-05
Ni-63	1.8e-04	7.2e-06	4.2e-05	3.9e-04	9.6e-04	3.6e-05	1.4e-06	8.3e-06	7.4e-05	1.9e-04
Zn-65	3.1e-05	2.1e-06	1.4e-05	7.1e-05	1.2e-04	6.2e-06	4.3e-07	2.8e-06	1.4e-05	2.4e-05
As-73	9.8e-05	4.6e-06	2.4e-05	2.0e-04	5.1e-04	1.9e-05	9.2e-07	4.6e-06	4.0e-05	1.0e-04
Se-75	2.9e-04	7.6e-07	4.1e-06	6.2e-04	1.9e-03	5.6e-05	1.5e-07	8.1e-07	1.2e-04	3.7e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.7e-03	6.6e-05	3.8e-04	3.6e-03	8.8e-03	3.3e-04	1.3e-05	7.6e-05	6.8e-04	1.7e-03
Tc-97	5.8e-05	2.3e-06	1.3e-05	1.2e-04	3.1e-04	1.1e-05	4.6e-07	2.6e-06	2.4e-05	6.0e-05
Tc-97m	2.2e-04	9.5e-06	5.2e-05	4.8e-04	1.2e-03	4.4e-05	1.9e-06	1.0e-05	9.4e-05	2.3e-04
Tc-99	4.8e-04	1.9e-05	1.1e-04	1.0e-03	2.6e-03	9.6e-05	3.9e-06	2.2e-05	2.0e-04	5.0e-04
Ru-103	3.1e-04	1.4e-05	7.2e-05	6.7e-04	1.6e-03	6.2e-05	2.8e-06	1.4e-05	1.3e-04	3.3e-04
Ru-106	2.6e-02	1.1e-03	6.1e-03	5.6e-02	1.4e-01	5.2e-03	2.1e-04	1.2e-03	1.1e-02	2.7e-02
Ag-108m	1.7e-03	6.1e-05	3.5e-04	3.6e-03	9.0e-03	3.3e-04	1.2e-05	6.9e-05	7.0e-04	1.8e-03
Ag-110m	2.0e-03	7.6e-05	4.3e-04	4.4e-03	1.1e-02	4.0e-04	1.5e-05	8.4e-05	8.6e-04	2.2e-03
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	5.2e-04	2.2e-05	1.2e-04	1.1e-03	2.7e-03	1.0e-04	4.4e-06	2.4e-05	2.2e-04	5.3e-04
Sb-124	2.5e-04	9.2e-06	1.4e-04	5.0e-04	7.7e-04	4.8e-05	1.8e-06	2.7e-05	1.0e-04	1.5e-04
Sb-125	1.8e-04	7.1e-06	1.0e-04	3.8e-04	5.8e-04	3.6e-05	1.4e-06	2.0e-05	7.5e-05	1.1e-04
Te-123m	1.6e-04	9.6e-07	5.1e-06	3.3e-04	1.0e-03	3.1e-05	1.9e-07	1.0e-06	6.6e-05	2.1e-04
Te-127m	3.2e-04	1.9e-06	1.0e-05	6.8e-04	2.1e-03	6.4e-05	3.9e-07	2.0e-06	1.3e-04	4.2e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.16 Normalized effective dose equivalents from inhalation: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	7.4e-06	3.1e-07	1.7e-06	1.6e-05	3.9e-05	1.5e-06	6.2e-08	3.4e-07	3.1e-06	7.7e-06
W-185	3.3e-05	1.4e-06	7.7e-06	7.1e-05	1.7e-04	6.6e-06	2.8e-07	1.5e-06	1.4e-05	3.5e-05
Os-185	1.6e-05	6.6e-07	4.0e-06	3.3e-05	8.1e-05	3.1e-06	1.7e-07	7.9e-07	6.6e-06	1.6e-05
Ir-192	8.0e-04	3.4e-05	1.8e-04	1.7e-03	4.1e-03	1.6e-04	6.8e-06	3.7e-05	3.3e-04	8.3e-04
Tl-204	6.2e-06	2.4e-07	1.2e-06	1.2e-05	3.3e-05	1.2e-06	4.8e-08	2.4e-07	2.5e-06	6.4e-06
Pb-210	5.8e-02	2.2e-03	1.2e-02	1.2e-01	3.0e-01	1.1e-02	4.5e-04	2.3e-03	2.3e-02	6.1e-02
Bi-207	4.0e-05	2.0e-06	1.0e-05	8.5e-05	2.0e-04	7.9e-06	4.0e-07	2.0e-06	1.6e-05	4.1e-05
Po-210	4.2e-03	0.0e+00	2.1e-03	9.1e-03	1.4e-02	8.3e-04	0.0e+00	4.2e-04	1.8e-03	2.8e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.17 Normalized effective dose equivalents from ingestion: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	8.4e-07	1.6e-08	2.0e-07	1.7e-06	3.9e-06	1.7e-07	3.2e-09	3.9e-08	3.3e-07	7.6e-07
C-14	3.5e-04	3.9e-06	5.4e-05	6.4e-04	1.8e-03	7.0e-05	7.6e-07	1.1e-05	1.2e-04	3.5e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	9.7e-05	1.5e-06	1.9e-05	1.8e-04	3.9e-04	1.9e-05	2.9e-07	3.9e-06	3.5e-05	7.9e-05
S-35	7.5e-06	1.4e-07	1.8e-06	1.5e-05	3.4e-05	1.5e-06	2.8e-08	3.5e-07	2.9e-06	6.8e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.2e-05	1.5e-07	1.9e-06	2.1e-05	5.8e-05	2.5e-06	3.0e-08	3.8e-07	4.2e-06	1.2e-05
Mn-53	1.5e-05	3.2e-08	4.9e-07	2.5e-05	8.7e-05	3.0e-06	6.2e-09	9.8e-08	4.9e-06	1.7e-05
Mn-54	3.7e-04	7.6e-07	1.2e-05	8.0e-04	2.1e-03	7.3e-05	1.5e-07	2.3e-06	1.2e-04	4.1e-04
Fe-55	1.1e-04	1.8e-06	2.4e-05	2.1e-04	5.4e-04	2.2e-05	3.6e-07	4.8e-06	4.1e-05	1.1e-04
Fe-59	8.0e-04	1.3e-05	1.7e-04	1.5e-03	3.7e-03	1.6e-04	2.6e-06	3.4e-05	3.0e-04	7.2e-04
Co-56	1.5e-03	2.5e-05	3.2e-04	2.8e-03	8.9e-03	2.9e-04	5.0e-06	6.5e-05	5.5e-04	1.4e-03
Co-57	1.3e-04	2.2e-06	2.9e-05	2.5e-04	6.3e-04	2.6e-05	4.3e-07	5.7e-06	4.9e-05	1.2e-04
Co-58	4.3e-04	7.2e-06	9.4e-05	8.0e-04	2.0e-03	8.4e-05	1.4e-06	1.9e-05	1.6e-04	3.9e-04
Co-60	1.9e-03	3.2e-05	4.2e-04	3.6e-03	9.4e-03	3.8e-04	6.2e-06	8.4e-05	7.2e-04	1.8e-03
Ni-59	4.0e-05	6.6e-07	8.8e-06	7.5e-05	1.9e-04	7.9e-06	1.3e-07	1.7e-06	1.5e-05	3.8e-05
Ni-63	1.1e-04	1.8e-06	2.4e-05	2.1e-04	5.3e-04	2.2e-05	3.5e-07	4.8e-06	4.1e-05	1.1e-04
Zn-65	7.3e-05	2.0e-06	2.9e-05	1.7e-04	2.9e-04	1.4e-05	4.0e-07	5.8e-06	3.4e-05	5.7e-05
As-73	6.5e-05	1.2e-06	1.5e-05	1.2e-04	3.1e-04	1.3e-05	2.3e-07	2.9e-06	2.4e-05	6.0e-05
Se-75	1.0e-03	1.1e-06	1.5e-05	1.7e-03	6.1e-03	2.1e-04	2.2e-07	3.0e-06	3.4e-04	1.2e-03
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	2.5e-04	4.3e-06	5.6e-05	4.8e-04	1.2e-03	5.1e-05	8.3e-07	1.1e-05	9.5e-05	2.4e-04
Tc-97	3.2e-05	5.4e-07	7.2e-06	6.2e-05	1.6e-04	6.4e-06	1.1e-07	1.4e-06	1.2e-05	3.1e-05
Tc-97m	1.9e-04	3.1e-06	4.1e-05	3.5e-04	8.7e-04	3.7e-05	6.2e-07	8.2e-06	6.9e-05	1.7e-04
Tc-99	2.8e-04	4.6e-06	6.1e-05	5.2e-04	1.3e-03	5.5e-05	9.0e-07	1.2e-05	1.0e-04	2.6e-04
Ru-103	3.5e-04	5.8e-06	7.5e-05	6.6e-04	1.6e-03	6.9e-05	1.2e-06	1.5e-05	1.3e-04	3.1e-04
Ru-106	4.9e-03	8.2e-05	1.1e-03	9.3e-03	2.4e-02	9.7e-04	1.6e-05	2.1e-04	1.8e-03	4.7e-03
Ag-108m	1.4e-03	2.1e-05	2.8e-04	2.6e-03	6.7e-03	2.8e-04	4.1e-06	5.5e-05	5.1e-04	1.3e-03
Ag-110m	1.8e-03	2.7e-05	3.6e-04	3.3e-03	8.8e-03	3.6e-04	5.4e-06	7.2e-05	6.7e-04	1.7e-03
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	5.0e-04	8.5e-06	1.1e-04	9.6e-04	2.4e-03	9.9e-05	1.7e-06	2.2e-05	1.9e-04	4.7e-04
Sb-124	3.3e-04	6.1e-06	1.5e-04	7.5e-04	1.1e-03	6.5e-05	1.2e-06	3.0e-05	1.5e-04	2.2e-04
Sb-125	1.6e-04	3.0e-06	7.3e-05	3.6e-04	5.5e-04	3.2e-05	5.9e-07	1.4e-05	7.1e-05	1.1e-04
Te-123m	2.7e-04	8.5e-07	8.8e-06	4.5e-04	1.5e-03	5.4e-05	1.3e-07	1.7e-06	8.9e-05	3.1e-04
Te-127m	4.2e-04	1.0e-06	1.4e-05	8.9e-04	2.4e-03	8.4e-05	2.0e-07	2.7e-06	1.4e-04	4.8e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.17 Normalized effective dose equivalents from ingestion: Handling metal product

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	4.6e-05	7.7e-07	1.0e-05	8.7e-05	2.2e-04	9.1e-06	1.5e-07	2.0e-06	1.7e-05	4.3e-05
W-185	2.3e-04	3.8e-06	5.0e-05	4.3e-04	1.1e-03	4.5e-05	7.7e-07	1.0e-05	8.5e-05	2.1e-04
Os-185	1.2e-05	2.3e-07	2.8e-06	2.3e-05	5.4e-05	2.3e-06	4.6e-08	5.5e-07	4.5e-06	1.1e-05
Ir-192	8.2e-04	1.4e-05	1.8e-04	1.6e-03	3.8e-03	1.6e-04	2.8e-06	3.6e-05	3.1e-04	7.5e-04
Tl-204	2.8e-05	4.1e-07	5.4e-06	5.1e-05	1.3e-04	5.5e-06	8.3e-08	1.1e-06	9.9e-06	2.6e-05
Pb-210	6.1e-02	9.3e-04	1.2e-02	1.1e-01	2.9e-01	1.2e-02	1.8e-04	2.3e-03	2.3e-02	5.7e-02
Bi-207	3.6e-05	6.8e-07	8.5e-06	6.9e-05	1.7e-04	7.1e-06	1.3e-07	1.7e-06	1.4e-05	3.2e-05
Po-210	3.1e-03	0.0e+00	1.3e-03	7.4e-03	1.1e-02	6.2e-04	0.0e+00	2.5e-04	1.4e-03	2.2e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.18 Normalized effective dose equivalents from all pathways: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.5e+00	4.7e-01	2.4e+00	8.0e+00	1.0e+01	6.9e-01	9.4e-02	4.7e-01	1.6e+00	2.0e+00
P-32	5.8e-05	3.5e-06	2.9e-05	1.4e-04	2.2e-04	1.1e-05	6.9e-07	5.7e-06	2.9e-05	4.3e-05
S-35	3.1e-06	3.5e-07	2.0e-06	7.3e-06	9.6e-06	6.2e-07	7.1e-08	4.0e-07	1.4e-06	1.9e-06
Cl-36	6.7e-04	6.5e-05	4.2e-04	1.6e-03	2.1e-03	1.3e-04	1.3e-05	8.3e-05	3.1e-04	4.1e-04
K-40	2.8e-01	3.8e-02	2.0e-01	6.6e-01	8.2e-01	5.6e-02	7.5e-03	3.9e-02	1.3e-01	1.6e-01
Ca-41	9.9e-06	9.8e-07	6.0e-06	2.4e-05	3.2e-05	1.9e-06	1.9e-07	1.2e-06	4.6e-06	6.3e-06
Ca-45	2.7e-05	3.0e-06	1.7e-05	6.2e-05	8.2e-05	5.2e-06	5.9e-07	3.3e-06	1.2e-05	1.6e-05
Sc-46	2.5e-01	3.0e-02	1.6e-01	5.6e-01	7.4e-01	4.9e-02	6.0e-03	3.2e-02	1.1e-01	1.4e-01
Cr-51	6.7e-04	6.4e-05	4.0e-04	1.6e-03	2.2e-03	1.3e-04	1.3e-05	7.8e-05	3.2e-04	4.3e-04
Mn-53	1.1e-06	1.4e-07	7.3e-07	2.5e-06	3.2e-06	2.1e-07	2.8e-08	1.4e-07	4.8e-07	6.3e-07
Mn-54	8.9e-02	1.2e-02	6.0e-02	2.0e-01	2.5e-01	1.7e-02	2.4e-03	1.2e-02	3.9e-02	5.0e-02
Fe-55	1.2e-06	1.3e-07	7.8e-07	3.0e-06	4.0e-06	2.5e-07	2.7e-08	1.5e-07	5.7e-07	7.9e-07
Fe-59	2.5e-02	2.7e-03	1.6e-02	5.7e-02	7.5e-02	4.8e-03	5.4e-04	3.1e-03	1.1e-02	1.5e-02
Co-56	9.6e-02	1.1e-02	6.0e-02	2.2e-01	3.0e-01	1.9e-02	2.2e-03	1.2e-02	4.4e-02	5.7e-02
Co-57	1.1e-03	1.3e-04	7.0e-04	2.5e-03	3.3e-03	2.1e-04	2.5e-05	1.4e-04	5.0e-04	6.4e-04
Co-58	2.3e-02	2.6e-03	1.4e-02	5.4e-02	7.2e-02	4.5e-03	5.2e-04	2.8e-03	1.1e-02	1.4e-02
Co-60	9.2e-02	1.1e-02	5.9e-02	2.2e-01	2.8e-01	1.8e-02	2.1e-03	1.2e-02	4.2e-02	5.4e-02
Ni-59	1.1e-06	1.4e-07	7.3e-07	2.6e-06	3.3e-06	2.2e-07	2.7e-08	1.5e-07	5.0e-07	6.5e-07
Ni-63	1.6e-06	1.8e-07	1.0e-06	3.8e-06	5.0e-06	3.2e-07	3.6e-08	2.0e-07	7.3e-07	9.8e-07
Zn-65	1.6e+00	2.2e-01	1.1e+00	3.7e+00	4.7e+00	3.2e-01	4.4e-02	2.2e-01	7.3e-01	9.2e-01
As-73	2.3e-04	2.7e-05	1.5e-04	5.3e-04	7.0e-04	4.5e-05	5.3e-06	3.0e-05	1.0e-04	1.4e-04
Se-75	5.6e-01	7.7e-02	3.9e-01	1.3e+00	1.6e+00	1.1e-01	1.5e-02	7.6e-02	2.5e-01	3.2e-01
Sr-85	4.7e-02	5.6e-03	3.1e-02	1.1e-01	1.4e-01	9.3e-03	1.1e-03	6.1e-03	2.1e-02	2.8e-02
Sr-89	2.2e-04	2.6e-05	1.4e-04	4.9e-04	6.6e-04	4.3e-05	5.1e-06	2.8e-05	9.7e-05	1.3e-04
Sr-90	2.2e-03	2.7e-04	1.5e-03	5.1e-03	6.7e-03	4.4e-04	5.3e-05	2.9e-04	9.9e-04	1.3e-03
Y-91	8.9e-04	8.6e-05	4.6e-04	1.6e-03	2.1e-03	1.4e-04	1.7e-05	9.0e-05	3.1e-04	4.0e-04
Zr-93	1.6e-04	1.9e-05	1.0e-04	3.6e-04	4.7e-04	3.1e-05	3.8e-06	2.0e-05	7.0e-05	9.2e-05
Zr-95	1.2e-01	1.6e-02	8.3e-02	2.9e-01	3.7e-01	2.5e-02	3.1e-03	1.6e-02	5.6e-02	7.2e-02
Nb-93m	5.5e-05	7.0e-06	3.6e-05	1.2e-04	1.6e-04	1.1e-05	1.4e-06	7.1e-06	2.5e-05	3.2e-05
Nb-94	2.5e-01	3.2e-02	1.7e-01	5.7e-01	7.4e-01	4.9e-02	6.5e-03	3.3e-02	1.1e-01	1.4e-01
Nb-95	5.9e-02	6.7e-03	3.7e-02	1.4e-01	1.8e-01	1.2e-02	1.3e-03	7.3e-03	2.7e-02	3.6e-02
Mo-93	1.3e-05	1.6e-06	8.5e-06	3.1e-05	4.0e-05	2.6e-06	3.1e-07	1.7e-06	6.0e-06	7.9e-06
Tc-97	1.2e-06	1.5e-07	7.9e-07	2.7e-06	3.6e-06	2.3e-07	2.9e-08	1.6e-07	5.3e-07	7.0e-07
Tc-97m	4.4e-06	5.3e-07	3.0e-06	1.0e-05	1.3e-05	8.7e-07	1.1e-07	5.8e-07	2.0e-06	2.7e-06
Tc-99	5.5e-06	6.4e-07	3.6e-06	1.3e-05	1.7e-05	1.1e-06	1.3e-07	7.1e-07	2.5e-06	3.3e-06
Ru-103	8.0e-03	8.6e-04	5.0e-03	1.9e-02	2.5e-02	1.6e-03	1.7e-04	9.8e-04	3.7e-03	5.0e-03
Ru-106	6.8e-03	8.1e-04	4.4e-03	1.6e-02	2.1e-02	1.3e-03	1.6e-04	8.8e-04	3.1e-03	4.1e-03
Ag-108m	6.3e-01	6.8e-02	3.9e-01	1.5e+00	2.0e+00	1.2e-01	1.3e-02	7.7e-02	2.9e-01	3.9e-01
Ag-110m	1.0e+00	1.1e-01	6.5e-01	2.5e+00	3.3e+00	2.1e-01	2.3e-02	1.3e-01	4.9e-01	6.6e-01
Cd-109	4.7e-03	6.7e-04	3.2e-03	1.1e-02	1.4e-02	9.3e-04	1.3e-04	6.4e-04	2.1e-03	2.6e-03
Sn-113	5.8e-03	6.9e-04	3.7e-03	1.3e-02	1.7e-02	1.1e-03	1.4e-04	7.3e-04	2.6e-03	3.4e-03
Sb-124	4.4e-01	4.2e-02	2.7e-01	1.0e+00	1.4e+00	8.6e-02	8.5e-03	5.2e-02	2.0e-01	2.8e-01
Sb-125	1.3e-01	1.3e-02	7.8e-02	3.0e-01	4.0e-01	2.5e-02	2.5e-03	1.5e-02	5.8e-02	7.9e-02
Te-123m	1.4e-01	1.9e-02	9.3e-02	3.1e-01	4.0e-01	2.7e-02	3.7e-03	1.8e-02	6.1e-02	7.8e-02
Te-127m	1.2e-02	1.6e-03	8.1e-03	2.7e-02	3.4e-02	2.3e-03	3.2e-04	1.6e-03	5.2e-03	6.7e-03
I-125	1.0e-03	7.5e-05	5.8e-04	2.5e-03	3.6e-03	2.0e-04	1.5e-05	1.1e-04	5.0e-04	7.0e-04
I-129	9.6e-03	8.1e-04	5.3e-03	2.4e-02	3.4e-02	1.9e-03	1.2e-04	1.0e-03	4.6e-03	6.6e-03
I-131	2.0e-02	2.6e-04	5.0e-03	5.0e-02	9.2e-02	3.9e-03	5.2e-05	9.9e-04	1.0e-02	1.8e-02
Cs-134	4.6e+00	6.3e-01	3.2e+00	1.1e+01	1.3e+01	9.1e-01	1.3e-01	6.3e-01	2.1e+00	2.6e+00
Cs-135	1.0e-03	1.0e-04	6.3e-04	2.5e-03	3.3e-03	2.0e-04	2.1e-05	1.2e-04	4.8e-04	6.5e-04
Cs-137	1.7e+00	2.3e-01	1.2e+00	3.9e+00	4.9e+00	3.4e-01	4.7e-02	2.3e-01	7.5e-01	9.6e-01
Ba-133	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.3e-01	8.2e-03	1.0e-03	5.3e-03	1.9e-02	2.4e-02
Ce-139	7.5e-03	9.3e-04	5.0e-03	1.7e-02	2.2e-02	1.5e-03	1.9e-04	9.9e-04	3.3e-03	4.4e-03
Ce-141	1.9e-03	2.0e-04	1.2e-03	4.4e-03	5.9e-03	3.7e-04	4.1e-05	2.4e-04	8.6e-04	1.2e-03
Ce-144	7.4e-03	9.4e-04	4.9e-03	1.7e-02	2.2e-02	1.5e-03	1.9e-04	9.8e-04	3.3e-03	4.3e-03
Pm-147	7.4e-05	9.2e-06	4.8e-05	1.7e-04	2.2e-04	1.5e-05	1.8e-06	9.6e-06	3.4e-05	4.3e-05

Table F1.18 Normalized effective dose equivalents from all pathways: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.5e-05	6.8e-06	3.6e-05	1.3e-04	1.6e-04	1.1e-05	1.4e-06	7.2e-06	2.4e-05	3.2e-05
Eu-152	1.8e-01	2.3e-02	1.2e-01	4.2e-01	5.6e-01	3.6e-02	4.7e-03	2.4e-02	8.1e-02	1.1e-01
Eu-154	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.6e-03	2.4e-02	7.9e-02	1.0e-01
Eu-155	1.5e-03	1.9e-04	1.0e-03	3.4e-03	4.4e-03	2.9e-04	3.9e-05	2.0e-04	6.6e-04	8.5e-04
Gd-153	1.7e-03	2.1e-04	1.1e-03	3.8e-03	5.0e-03	3.3e-04	4.2e-05	2.2e-04	7.4e-04	9.7e-04
Tb-160	1.3e-01	1.5e-02	8.3e-02	2.9e-01	3.8e-01	2.5e-02	3.1e-03	1.6e-02	5.7e-02	7.4e-02
Tm-170	1.6e-04	2.1e-05	1.1e-04	3.7e-04	4.8e-04	3.2e-05	4.2e-06	2.2e-05	7.3e-05	9.4e-05
Tm-171	2.3e-05	3.0e-06	1.5e-05	5.2e-05	6.8e-05	4.5e-06	5.8e-07	3.0e-06	1.0e-05	1.3e-05
Ta-182	1.6e-01	2.0e-02	1.1e-01	3.8e-01	4.9e-01	3.2e-02	4.1e-03	2.1e-02	7.5e-02	9.6e-02
W-181	6.3e-05	7.6e-06	4.0e-05	1.5e-04	1.9e-04	1.2e-05	1.5e-06	8.0e-06	2.9e-05	3.7e-05
W-185	2.6e-06	2.8e-07	1.6e-06	6.1e-06	8.4e-06	5.2e-07	5.7e-08	3.2e-07	1.2e-06	1.7e-06
Os-185	1.5e+00	2.0e-01	1.0e+00	3.3e+00	4.2e+00	2.9e-01	3.9e-02	2.0e-01	6.5e-01	8.4e-01
Ir-192	1.6e-02	1.8e-03	1.0e-02	3.7e-02	4.9e-02	3.1e-03	3.7e-04	2.0e-03	7.3e-03	9.4e-03
Tl-204	1.4e-03	1.9e-04	9.8e-04	3.2e-03	4.1e-03	2.8e-04	3.9e-05	1.9e-04	6.3e-04	8.1e-04
Pb-210	1.6e+00	2.0e-01	1.1e+00	3.6e+00	4.7e+00	3.1e-01	4.0e-02	2.1e-01	7.2e-01	9.3e-01
Bi-207	4.6e+00	6.3e-01	3.2e+00	1.1e+01	1.3e+01	9.1e-01	1.3e-01	6.2e-01	2.0e+00	2.6e+00
Po-210	4.2e-01	5.5e-02	2.8e-01	9.6e-01	1.2e+00	8.3e-02	1.1e-02	5.5e-02	1.9e-01	2.5e-01
Ra-226	3.1e-01	3.9e-02	2.1e-01	7.1e-01	9.0e-01	6.0e-02	7.8e-03	4.1e-02	1.4e-01	1.8e-01
Ra-228	1.9e-01	2.4e-02	1.2e-01	4.3e-01	5.5e-01	3.6e-02	4.8e-03	2.5e-02	8.3e-02	1.1e-01
Ac-227	2.4e+00	3.0e-01	1.6e+00	5.6e+00	7.3e+00	4.8e-01	5.9e-02	3.2e-01	1.1e+00	1.4e+00
Th-228	8.3e-01	1.1e-01	5.5e-01	1.8e+00	2.4e+00	1.6e-01	2.1e-02	1.1e-01	3.6e-01	4.7e-01
Th-229	3.1e+00	3.9e-01	2.0e+00	7.1e+00	9.3e+00	6.2e-01	7.8e-02	4.1e-01	1.4e+00	1.8e+00
Th-230	4.7e-01	5.8e-02	3.0e-01	1.1e+00	1.4e+00	9.2e-02	1.2e-02	6.0e-02	2.1e-01	2.7e-01
Th-232	2.1e+00	2.5e-01	1.3e+00	4.7e+00	6.1e+00	4.0e-01	5.1e-02	2.6e-01	9.1e-01	1.2e+00
Pa-231	1.6e+00	1.9e-01	1.1e+00	3.6e+00	4.8e+00	3.1e-01	3.9e-02	2.1e-01	7.0e-01	9.3e-01
U-232	1.2e+00	1.5e-01	7.8e-01	2.7e+00	3.6e+00	2.3e-01	2.9e-02	1.6e-01	5.4e-01	6.9e-01
U-233	2.4e-01	2.9e-02	1.6e-01	5.5e-01	7.2e-01	4.7e-02	5.8e-03	3.1e-02	1.1e-01	1.4e-01
U-234	2.3e-01	2.9e-02	1.5e-01	5.4e-01	7.0e-01	4.6e-02	5.7e-03	3.0e-02	1.1e-01	1.4e-01
U-235	2.3e-01	2.8e-02	1.5e-01	5.2e-01	6.8e-01	4.5e-02	5.6e-03	3.0e-02	1.0e-01	1.3e-01
U-236	2.2e-01	2.7e-02	1.4e-01	5.1e-01	6.6e-01	4.3e-02	5.4e-03	2.9e-02	1.0e-01	1.3e-01
U-238	2.1e-01	2.6e-02	1.4e-01	4.9e-01	6.4e-01	4.2e-02	5.2e-03	2.8e-02	9.6e-02	1.2e-01
Np-237	1.0e+00	1.2e-01	6.5e-01	2.3e+00	3.0e+00	2.0e-01	2.4e-02	1.3e-01	4.5e-01	5.9e-01
Pu-236	2.3e-01	2.8e-02	1.5e-01	5.4e-01	6.9e-01	4.5e-02	5.6e-03	3.0e-02	1.0e-01	1.4e-01
Pu-238	5.3e-01	6.5e-02	3.4e-01	1.2e+00	1.6e+00	1.0e-01	1.3e-02	6.8e-02	2.4e-01	3.1e-01
Pu-239	5.7e-01	6.9e-02	3.7e-01	1.3e+00	1.7e+00	1.1e-01	1.4e-02	7.3e-02	2.6e-01	3.3e-01
Pu-240	5.7e-01	6.9e-02	3.7e-01	1.3e+00	1.7e+00	1.1e-01	1.4e-02	7.3e-02	2.6e-01	3.3e-01
Pu-241	9.2e-03	1.1e-03	6.0e-03	2.1e-02	2.8e-02	1.8e-03	2.3e-04	1.2e-03	4.2e-03	5.4e-03
Pu-242	5.4e-01	6.6e-02	3.5e-01	1.2e+00	1.6e+00	1.1e-01	1.3e-02	6.9e-02	2.4e-01	3.2e-01
Pu-244	5.8e-01	7.3e-02	3.8e-01	1.3e+00	1.7e+00	1.1e-01	1.4e-02	7.5e-02	2.6e-01	3.4e-01
Am-241	8.0e-01	9.7e-02	5.1e-01	1.8e+00	2.4e+00	1.6e-01	1.9e-02	1.0e-01	3.6e-01	4.7e-01
Am-242m	7.9e-01	9.6e-02	5.1e-01	1.8e+00	2.4e+00	1.6e-01	1.9e-02	1.0e-01	3.5e-01	4.7e-01
Am-243	8.1e-01	9.8e-02	5.2e-01	1.8e+00	2.4e+00	1.6e-01	1.9e-02	1.0e-01	3.6e-01	4.8e-01
Cm-242	2.7e-02	3.3e-03	1.7e-02	6.3e-02	8.1e-02	5.3e-03	6.4e-04	3.4e-03	1.2e-02	1.6e-02
Cm-243	5.6e-01	7.0e-02	3.6e-01	1.3e+00	1.7e+00	1.1e-01	1.4e-02	7.2e-02	2.6e-01	3.3e-01
Cm-244	4.5e-01	5.5e-02	2.8e-01	1.1e+00	1.3e+00	8.8e-02	1.1e-02	5.7e-02	2.1e-01	2.6e-01
Cm-245	8.3e-01	1.0e-01	5.3e-01	1.9e+00	2.5e+00	1.6e-01	2.0e-02	1.1e-01	3.8e-01	4.9e-01
Cm-246	8.2e-01	1.0e-01	5.2e-01	1.9e+00	2.5e+00	1.6e-01	2.0e-02	1.0e-01	3.8e-01	4.8e-01
Cm-247	7.9e-01	9.9e-02	5.1e-01	1.9e+00	2.4e+00	1.6e-01	2.0e-02	1.0e-01	3.7e-01	4.6e-01
Cm-248	3.0e+00	3.7e-01	1.9e+00	7.0e+00	9.0e+00	5.9e-01	7.3e-02	3.8e-01	1.4e+00	1.8e+00
Bk-249	2.5e-03	3.1e-04	1.6e-03	5.7e-03	7.3e-03	4.8e-04	6.1e-05	3.1e-04	1.1e-03	1.5e-03
Cf-248	8.6e-02	1.1e-02	5.6e-02	2.0e-01	2.6e-01	1.7e-02	2.1e-03	1.1e-02	3.9e-02	5.0e-02
Cf-249	7.4e-01	9.3e-02	4.8e-01	1.7e+00	2.2e+00	1.5e-01	1.8e-02	9.6e-02	3.3e-01	4.3e-01
Cf-250	3.7e-01	4.6e-02	2.4e-01	8.5e-01	1.1e+00	7.3e-02	9.1e-03	4.8e-02	1.7e-01	2.2e-01
Cf-251	7.2e-01	8.9e-02	4.7e-01	1.6e+00	2.1e+00	1.4e-01	1.8e-02	9.3e-02	3.2e-01	4.2e-01
Cf-252	2.8e-01	3.4e-02	1.8e-01	6.3e-01	8.2e-01	5.4e-02	6.7e-03	3.6e-02	1.2e-01	1.6e-01
Cf-254	2.2e+00	2.9e-01	1.5e+00	5.1e+00	6.6e+00	4.4e-01	5.7e-02	2.9e-01	1.0e+00	1.3e+00
Es-254	2.1e-01	2.7e-02	1.4e-01	4.8e-01	6.3e-01	4.1e-02	5.4e-03	2.7e-02	9.3e-02	1.2e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.19 Normalized effective dose equivalents from external exposure: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.5e+00	4.7e-01	2.4e+00	8.0e+00	1.0e+01	6.9e-01	9.4e-02	4.7e-01	1.6e+00	2.0e+00
P-32	5.0e-05	3.0e-06	2.5e-05	1.2e-04	1.9e-04	9.9e-06	6.0e-07	4.9e-06	2.4e-05	3.6e-05
S-35	6.9e-08	8.1e-09	4.6e-08	1.6e-07	2.1e-07	1.4e-08	1.6e-09	9.1e-09	3.1e-08	4.1e-08
Cl-36	3.9e-04	3.7e-05	2.4e-04	9.3e-04	1.2e-03	7.7e-05	7.3e-06	4.8e-05	1.8e-04	2.4e-04
K-40	2.8e-01	3.8e-02	1.9e-01	6.6e-01	8.2e-01	5.6e-02	7.5e-03	3.8e-02	1.3e-01	1.6e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	7.5e-07	9.6e-08	5.0e-07	1.7e-06	2.2e-06	1.5e-07	1.9e-08	9.8e-08	3.3e-07	4.3e-07
Sc-46	2.5e-01	3.0e-02	1.6e-01	5.6e-01	7.4e-01	4.9e-02	6.0e-03	3.2e-02	1.1e-01	1.4e-01
Cr-51	6.7e-04	6.4e-05	4.0e-04	1.6e-03	2.2e-03	1.3e-04	1.3e-05	7.8e-05	3.2e-04	4.3e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.9e-02	1.2e-02	6.0e-02	2.0e-01	2.5e-01	1.7e-02	2.4e-03	1.2e-02	3.9e-02	5.0e-02
Fe-55	1.6e-12	1.9e-13	1.0e-12	3.6e-12	4.8e-12	3.1e-13	3.8e-14	2.1e-13	6.9e-13	9.4e-13
Fe-59	2.5e-02	2.7e-03	1.6e-02	5.7e-02	7.5e-02	4.8e-03	5.4e-04	3.1e-03	1.1e-02	1.5e-02
Co-56	9.6e-02	1.1e-02	6.0e-02	2.2e-01	3.0e-01	1.9e-02	2.2e-03	1.2e-02	4.4e-02	5.7e-02
Co-57	1.1e-03	1.3e-04	6.9e-04	2.5e-03	3.3e-03	2.1e-04	2.5e-05	1.4e-04	5.0e-04	6.4e-04
Co-58	2.3e-02	2.6e-03	1.4e-02	5.4e-02	7.2e-02	4.5e-03	5.2e-04	2.8e-03	1.1e-02	1.4e-02
Co-60	9.2e-02	1.1e-02	5.9e-02	2.2e-01	2.8e-01	1.8e-02	2.1e-03	1.2e-02	4.2e-02	5.4e-02
Ni-59	4.9e-07	5.9e-08	3.2e-07	1.1e-06	1.5e-06	9.7e-08	1.2e-08	6.4e-08	2.2e-07	2.9e-07
Ni-63	4.6e-10	5.6e-11	3.1e-10	1.1e-09	1.4e-09	9.1e-11	1.1e-11	6.1e-11	2.1e-10	2.7e-10
Zn-65	1.6e+00	2.2e-01	1.1e+00	3.7e+00	4.7e+00	3.2e-01	4.4e-02	2.2e-01	7.2e-01	9.2e-01
As-73	1.8e-04	2.1e-05	1.2e-04	4.3e-04	5.7e-04	3.6e-05	4.2e-06	2.3e-05	8.4e-05	1.1e-04
Se-75	5.6e-01	7.7e-02	3.9e-01	1.3e+00	1.6e+00	1.1e-01	1.5e-02	7.5e-02	2.5e-01	3.2e-01
Sr-85	4.7e-02	5.6e-03	3.1e-02	1.1e-01	1.4e-01	9.3e-03	1.1e-03	6.1e-03	2.1e-02	2.8e-02
Sr-89	1.8e-04	2.1e-05	1.2e-04	4.0e-04	5.4e-04	3.5e-05	4.1e-06	2.3e-05	7.9e-05	1.0e-04
Sr-90	8.9e-04	1.1e-04	5.9e-04	2.0e-03	2.7e-03	1.7e-04	2.2e-05	1.2e-04	3.9e-04	5.2e-04
Y-91	6.0e-04	7.3e-05	3.9e-04	1.4e-03	1.8e-03	1.2e-04	1.5e-05	7.7e-05	2.7e-04	3.5e-04
Zr-93	4.2e-09	5.2e-10	2.8e-09	9.6e-09	1.2e-08	8.2e-10	1.0e-10	5.5e-10	1.9e-09	2.4e-09
Zr-95	1.2e-01	1.6e-02	8.3e-02	2.9e-01	3.7e-01	2.5e-02	3.1e-03	1.6e-02	5.6e-02	7.2e-02
Nb-93m	3.8e-07	4.8e-08	2.5e-07	8.6e-07	1.1e-06	7.4e-08	9.8e-09	5.0e-08	1.7e-07	2.2e-07
Nb-94	2.5e-01	3.2e-02	1.7e-01	5.7e-01	7.4e-01	4.9e-02	6.5e-03	3.3e-02	1.1e-01	1.4e-01
Nb-95	5.9e-02	6.7e-03	3.7e-02	1.4e-01	1.8e-01	1.2e-02	1.3e-03	7.3e-03	2.7e-02	3.6e-02
Mo-93	4.4e-07	5.4e-08	2.9e-07	1.0e-06	1.3e-06	8.7e-08	1.1e-08	5.8e-08	2.0e-07	2.6e-07
Tc-97	5.9e-07	6.9e-08	3.9e-07	1.4e-06	1.8e-06	1.2e-07	1.4e-08	7.7e-08	2.7e-07	3.5e-07
Tc-97m	1.9e-06	2.2e-07	1.2e-06	4.4e-06	5.7e-06	3.7e-07	4.4e-08	2.4e-07	8.5e-07	1.1e-06
Tc-99	4.3e-07	5.0e-08	2.8e-07	9.9e-07	1.3e-06	8.5e-08	1.0e-08	5.6e-08	1.9e-07	2.5e-07
Ru-103	8.0e-03	8.5e-04	5.0e-03	1.9e-02	2.5e-02	1.6e-03	1.7e-04	9.8e-04	3.7e-03	5.0e-03
Ru-106	8.6e-03	7.9e-04	4.3e-03	1.5e-02	2.0e-02	1.3e-03	1.6e-04	8.5e-04	3.1e-03	4.0e-03
Ag-108m	6.3e-01	6.8e-02	3.9e-01	1.5e+00	2.0e+00	1.2e-01	1.3e-02	7.7e-02	2.9e-01	3.9e-01
Ag-110m	1.0e+00	1.1e-01	6.5e-01	2.5e+00	3.3e+00	2.1e-01	2.3e-02	1.3e-01	4.9e-01	6.6e-01
Cd-109	1.7e-03	2.3e-04	1.2e-03	3.9e-03	5.0e-03	3.4e-04	4.7e-05	2.3e-04	7.6e-04	9.7e-04
Sn-113	5.8e-03	6.9e-04	3.7e-03	1.3e-02	1.7e-02	1.1e-03	1.4e-04	7.3e-04	2.6e-03	3.4e-03
Sb-124	4.4e-01	4.2e-02	2.7e-01	1.0e+00	1.4e+00	8.6e-02	8.5e-03	5.2e-02	2.0e-01	2.8e-01
Sb-125	1.2e-01	1.3e-02	7.8e-02	3.0e-01	4.0e-01	2.5e-02	2.5e-03	1.5e-02	5.8e-02	7.9e-02
Te-123m	1.4e-01	1.9e-02	9.3e-02	3.1e-01	3.9e-01	2.7e-02	3.7e-03	1.8e-02	6.0e-02	7.7e-02
Te-127m	1.0e-02	1.4e-03	7.0e-03	2.4e-02	3.0e-02	2.0e-03	2.8e-04	1.4e-03	4.6e-03	5.9e-03
I-125	1.8e-04	1.6e-05	1.1e-04	4.3e-04	6.0e-04	3.6e-05	3.1e-06	2.1e-05	8.5e-05	1.2e-04
I-129	2.2e-04	1.9e-05	1.3e-04	5.3e-04	7.4e-04	4.4e-05	4.0e-06	2.6e-05	1.0e-04	1.4e-04
I-131	2.0e-02	2.6e-04	5.0e-03	5.0e-02	9.3e-02	3.9e-03	5.2e-05	9.8e-04	9.9e-03	1.8e-02
Cs-134	4.6e+00	6.3e-01	3.1e+00	1.1e+01	1.3e+01	9.1e-01	1.3e-01	6.2e-01	2.1e+00	2.6e+00
Cs-135	4.8e-05	6.5e-06	3.2e-05	1.1e-04	1.4e-04	9.4e-06	1.3e-06	6.4e-06	2.1e-05	2.7e-05
Cs-137	1.7e+00	2.3e-01	1.2e+00	3.9e+00	4.9e+00	3.4e-01	4.6e-02	2.3e-01	7.5e-01	9.6e-01
Ba-133	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.2e-01	8.2e-03	1.0e-03	5.3e-03	1.9e-02	2.4e-02
Ce-139	7.5e-03	9.2e-04	5.0e-03	1.7e-02	2.2e-02	1.5e-03	1.9e-04	9.9e-04	3.3e-03	4.4e-03
Ce-141	1.9e-03	2.0e-04	1.2e-03	4.4e-03	5.9e-03	3.7e-04	4.1e-05	2.3e-04	8.5e-04	1.2e-03
Ce-144	6.7e-03	8.3e-04	4.4e-03	1.5e-02	2.0e-02	1.3e-03	1.7e-04	8.8e-04	3.0e-03	3.9e-03
Pm-147	5.9e-07	7.6e-08	3.9e-07	1.4e-06	1.7e-06	1.2e-07	1.5e-08	7.8e-08	2.7e-07	3.4e-07

Table F1.19 Normalized effective dose equivalents from external exposure: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	7.5e-09	9.8e-10	5.0e-09	1.7e-08	2.2e-08	1.5e-09	2.0e-10	1.0e-09	3.3e-09	4.4e-09
Eu-152	1.8e-01	2.3e-02	1.2e-01	4.2e-01	5.4e-01	3.6e-02	4.7e-03	2.4e-02	8.1e-02	1.0e-01
Eu-154	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.6e-03	2.3e-02	7.9e-02	1.0e-01
Eu-155	1.4e-03	1.8e-04	9.4e-04	3.2e-03	4.2e-03	2.8e-04	3.6e-05	1.8e-04	6.2e-04	8.1e-04
Gd-153	1.6e-03	2.1e-04	1.1e-03	3.7e-03	5.0e-03	3.2e-04	4.2e-05	2.2e-04	7.3e-04	9.6e-04
Tb-160	1.3e-01	1.5e-02	8.3e-02	2.9e-01	3.8e-01	2.5e-02	3.1e-03	1.6e-02	5.7e-02	7.4e-02
Tm-170	9.9e-05	1.2e-05	6.8e-05	2.3e-04	3.0e-04	1.9e-05	2.5e-06	1.3e-05	4.4e-05	5.9e-05
Tm-171	4.7e-06	5.9e-07	3.2e-06	1.1e-05	1.4e-05	9.3e-07	1.2e-07	6.3e-07	2.1e-06	2.8e-06
Ta-182	1.6e-01	2.0e-02	1.1e-01	3.8e-01	4.9e-01	3.2e-02	4.1e-03	2.1e-02	7.5e-02	9.6e-02
W-181	6.3e-05	7.5e-06	4.0e-05	1.4e-04	1.9e-04	1.2e-05	1.5e-06	7.9e-06	2.9e-05	3.7e-05
W-185	9.8e-07	1.2e-07	6.2e-07	2.3e-06	3.0e-06	1.9e-07	2.3e-08	1.2e-07	4.4e-07	5.9e-07
Os-185	1.5e+00	2.0e-01	1.0e+00	3.3e+00	4.2e+00	2.9e-01	3.9e-02	2.0e-01	6.5e-01	8.3e-01
Ir-192	1.6e-02	1.8e-03	1.0e-02	3.7e-02	4.9e-02	3.1e-03	3.7e-04	2.0e-03	7.3e-03	9.4e-03
Tl-204	9.6e-04	1.3e-04	6.5e-04	2.2e-03	2.8e-03	1.9e-04	2.6e-05	1.3e-04	4.3e-04	5.4e-04
Pb-210	2.3e-03	3.1e-04	1.6e-03	5.2e-03	6.6e-03	4.5e-04	6.2e-05	3.1e-04	1.0e-03	1.3e-03
Bi-207	4.6e+00	6.3e-01	3.2e+00	1.1e+01	1.3e+01	9.1e-01	1.3e-01	6.2e-01	2.0e+00	2.6e+00
Po-210	2.5e-05	3.4e-06	1.7e-05	5.7e-05	7.2e-05	4.9e-06	6.7e-07	3.3e-06	1.1e-05	1.4e-05
Ra-226	2.8e-01	3.6e-02	1.9e-01	6.6e-01	8.4e-01	5.6e-02	7.1e-03	3.7e-02	1.3e-01	1.6e-01
Ra-228	1.5e-01	1.8e-02	9.7e-02	3.4e-01	4.3e-01	2.9e-02	3.6e-03	1.9e-02	6.6e-02	8.4e-02
Ac-227	4.3e-02	5.6e-03	2.9e-02	1.0e-01	1.3e-01	8.5e-03	1.1e-03	5.8e-03	2.0e-02	2.5e-02
Th-228	2.4e-01	3.0e-02	1.6e-01	5.4e-01	6.9e-01	4.6e-02	5.8e-03	3.1e-02	1.1e-01	1.3e-01
Th-229	3.2e-02	4.0e-03	2.1e-02	7.2e-02	9.3e-02	6.2e-03	7.9e-04	4.2e-03	1.4e-02	1.8e-02
Th-230	2.5e-05	2.9e-06	1.7e-05	5.7e-05	7.5e-05	5.0e-06	5.9e-07	3.2e-06	1.1e-05	1.5e-05
Th-232	1.8e-03	1.7e-04	1.1e-03	4.4e-03	5.9e-03	3.6e-04	3.3e-05	2.2e-04	8.6e-04	1.1e-03
Pa-231	3.7e-03	4.6e-04	2.5e-03	8.3e-03	1.1e-02	7.2e-04	9.2e-05	4.8e-04	1.6e-03	2.1e-03
U-232	9.1e-03	8.7e-04	5.6e-03	2.2e-02	2.9e-02	1.8e-03	1.7e-04	1.1e-03	4.3e-03	5.8e-03
U-233	1.5e-05	2.0e-06	1.0e-05	3.5e-05	4.5e-05	3.0e-06	4.0e-07	2.1e-06	6.9e-06	8.9e-06
U-234	3.1e-06	3.9e-07	2.1e-06	7.1e-06	9.0e-06	6.1e-07	7.9e-08	4.1e-07	1.4e-06	1.8e-06
U-235	1.2e-02	1.5e-03	8.0e-03	2.7e-02	3.5e-02	2.4e-03	3.1e-04	1.6e-03	5.4e-03	6.9e-03
U-236	1.4e-06	1.7e-07	9.3e-07	3.2e-06	4.0e-06	2.7e-07	3.5e-08	1.8e-07	6.2e-07	8.0e-07
U-238	3.8e-03	4.8e-04	2.5e-03	8.6e-03	1.1e-02	7.4e-04	9.7e-05	5.0e-04	1.7e-03	2.2e-03
Np-237	2.3e-02	2.8e-03	1.5e-02	5.1e-02	6.7e-02	4.4e-03	5.8e-04	3.0e-03	9.9e-03	1.3e-02
Pu-236	7.2e-06	5.6e-07	4.0e-06	1.8e-05	2.4e-05	1.4e-06	1.1e-07	7.9e-07	3.5e-06	4.7e-06
Pu-238	7.7e-07	9.5e-08	5.1e-07	1.6e-06	2.3e-06	1.5e-07	1.9e-08	1.0e-07	3.5e-07	4.5e-07
Pu-239	4.6e-06	5.6e-07	3.0e-06	1.0e-05	1.4e-05	9.0e-07	1.1e-07	6.0e-07	2.0e-06	2.7e-06
Pu-240	7.2e-07	9.0e-08	4.8e-07	1.7e-06	2.2e-06	1.4e-07	1.8e-08	9.6e-08	3.2e-07	4.2e-07
Pu-241	9.0e-08	1.1e-08	6.0e-08	2.1e-07	2.7e-07	1.8e-08	2.2e-09	1.2e-08	4.0e-08	5.3e-08
Pu-242	6.5e-07	8.0e-08	4.3e-07	1.5e-06	1.9e-06	1.3e-07	1.6e-08	8.6e-08	2.9e-07	3.8e-07
Pu-244	5.0e-02	6.1e-03	3.3e-02	1.1e-01	1.5e-01	9.7e-03	1.2e-03	6.5e-03	2.2e-02	2.9e-02
Am-241	2.1e-04	2.6e-05	1.4e-04	4.7e-04	6.1e-04	4.1e-05	5.3e-06	2.7e-05	9.2e-05	1.2e-04
Am-242m	9.5e-04	1.2e-04	6.3e-04	2.2e-03	2.8e-03	1.9e-04	2.4e-05	1.2e-04	4.2e-04	5.5e-04
Am-243	1.3e-02	1.6e-03	8.6e-03	2.9e-02	3.8e-02	2.6e-03	3.3e-04	1.7e-03	5.7e-03	7.4e-03
Cm-242	8.1e-07	1.0e-07	5.3e-07	1.9e-06	2.4e-06	1.6e-07	2.0e-08	1.0e-07	3.7e-07	4.7e-07
Cm-243	9.2e-03	1.2e-03	6.1e-03	2.1e-02	2.7e-02	1.8e-03	2.4e-04	1.2e-03	4.2e-03	5.4e-03
Cm-244	8.0e-07	1.0e-07	5.3e-07	1.9e-06	2.4e-06	1.6e-07	2.1e-08	1.0e-07	3.5e-07	4.7e-07
Cm-245	4.1e-03	5.2e-04	2.7e-03	9.4e-03	1.2e-02	8.0e-04	1.0e-04	5.3e-04	1.8e-03	2.4e-03
Cm-246	3.3e-07	4.3e-08	2.2e-07	7.7e-07	9.9e-07	6.5e-08	8.5e-09	4.3e-08	1.5e-07	1.9e-07
Cm-247	4.1e-02	5.3e-03	2.8e-02	9.6e-02	1.2e-01	8.2e-03	1.1e-03	5.4e-03	1.9e-02	2.4e-02
Cm-248	3.1e-07	3.9e-08	2.0e-07	7.1e-07	9.1e-07	6.0e-08	7.8e-09	4.0e-08	1.4e-07	1.8e-07
Bk-249	8.2e-06	7.7e-07	5.0e-06	2.0e-05	2.7e-05	1.6e-06	1.5e-07	9.9e-07	3.9e-06	5.2e-06
Cf-248	9.7e-07	1.3e-07	6.5e-07	2.2e-06	2.9e-06	1.9e-07	2.5e-08	1.3e-07	4.4e-07	5.7e-07
Cf-249	4.1e-02	5.3e-03	2.7e-02	9.4e-02	1.2e-01	8.0e-03	1.1e-03	5.4e-03	1.9e-02	2.4e-02
Cf-250	3.7e-07	4.9e-08	2.5e-07	8.7e-07	1.1e-06	7.4e-08	9.8e-09	4.9e-08	1.7e-07	2.2e-07
Cf-251	6.9e-03	8.9e-04	4.6e-03	1.6e-02	2.0e-02	1.3e-03	1.8e-04	9.0e-04	3.1e-03	4.0e-03
Cf-252	9.7e-07	1.2e-07	6.5e-07	2.2e-06	2.9e-06	1.9e-07	2.5e-08	1.3e-07	4.4e-07	5.6e-07
Cf-254	1.9e+00	2.4e-01	1.2e+00	4.3e+00	5.6e+00	3.7e-01	4.7e-02	2.4e-01	8.5e-01	1.1e+00
Es-254	1.4e-01	1.7e-02	9.1e-02	3.2e-01	4.2e-01	2.7e-02	3.5e-03	1.8e-02	6.3e-02	8.1e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.20 Normalized effective dose equivalents from inhalation: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.3e-04	1.7e-05	9.0e-05	3.1e-04	3.9e-04	2.6e-05	3.4e-06	1.8e-05	6.0e-05	7.6e-05
P-32	1.3e-06	7.7e-08	6.6e-07	3.3e-06	5.0e-06	2.7e-07	1.6e-08	1.3e-07	6.5e-07	9.7e-07
S-35	1.9e-06	2.1e-07	1.2e-06	4.4e-06	6.0e-06	3.8e-07	4.3e-08	2.4e-07	8.6e-07	1.2e-06
Cl-36	1.9e-04	1.7e-05	1.2e-04	4.6e-04	6.3e-04	3.7e-05	3.4e-06	2.3e-05	8.7e-05	1.2e-04
K-40	2.2e-04	2.9e-05	1.5e-04	5.1e-04	6.4e-04	4.4e-05	5.7e-06	2.9e-05	9.8e-05	1.3e-04
Ca-41	2.4e-06	2.9e-07	1.6e-06	5.4e-06	7.1e-06	4.7e-07	5.7e-08	3.1e-07	1.1e-06	1.4e-06
Ca-45	1.0e-05	1.2e-06	6.6e-06	2.3e-05	3.0e-05	2.0e-06	2.4e-07	1.3e-06	4.4e-06	5.7e-06
Sc-46	3.8e-05	4.4e-06	2.5e-05	8.8e-05	1.2e-04	7.5e-06	8.7e-07	4.9e-06	1.7e-05	2.3e-05
Cr-51	1.0e-07	9.5e-09	6.1e-08	2.5e-07	3.4e-07	2.0e-08	1.9e-09	1.2e-08	4.9e-08	6.7e-08
Mn-53	8.3e-07	8.3e-08	4.2e-07	1.4e-06	1.8e-06	1.2e-07	1.6e-08	8.3e-08	2.8e-07	3.6e-07
Mn-54	7.8e-06	1.0e-06	5.2e-06	1.8e-05	2.3e-05	1.5e-06	2.0e-07	1.0e-06	3.5e-06	4.4e-06
Fe-55	5.0e-07	5.6e-08	3.2e-07	1.1e-06	1.5e-06	9.7e-08	1.1e-08	6.3e-08	2.2e-07	3.0e-07
Fe-59	2.6e-06	2.7e-07	1.6e-06	6.1e-06	8.2e-06	5.1e-07	5.5e-08	3.2e-07	1.2e-06	1.6e-06
Co-56	1.1e-05	1.2e-06	6.7e-06	2.6e-05	3.4e-05	2.1e-06	2.4e-07	1.3e-06	5.1e-06	6.6e-06
Co-57	3.1e-06	3.5e-07	1.9e-06	7.4e-06	9.8e-06	6.2e-07	7.0e-08	3.8e-07	1.5e-06	1.9e-06
Co-58	2.9e-06	3.1e-07	1.8e-06	6.8e-06	9.0e-06	5.6e-07	6.2e-08	3.5e-07	1.3e-06	1.8e-06
Co-60	8.2e-05	9.2e-06	5.1e-05	2.0e-04	2.6e-04	1.6e-05	1.8e-06	1.0e-05	3.8e-05	5.1e-05
Ni-59	3.5e-07	3.9e-08	2.3e-07	8.0e-07	1.1e-06	6.8e-08	7.9e-09	4.5e-08	1.6e-07	2.2e-07
Ni-63	8.7e-07	9.7e-08	5.7e-07	2.0e-06	2.7e-06	1.7e-07	2.0e-08	1.1e-07	3.9e-07	5.4e-07
Zn-65	6.0e-04	7.9e-05	4.0e-04	1.4e-03	1.7e-03	1.2e-04	1.5e-05	7.9e-05	2.7e-04	3.5e-04
As-73	2.7e-05	3.0e-06	1.7e-05	6.4e-05	8.5e-05	5.4e-06	5.9e-07	3.4e-06	1.2e-05	1.7e-05
Se-75	2.3e-04	3.0e-05	1.5e-04	5.3e-04	6.8e-04	4.6e-05	6.0e-06	3.1e-05	1.0e-04	1.3e-04
Sr-85	2.3e-06	2.6e-07	1.5e-06	5.2e-06	7.1e-06	4.5e-07	5.2e-08	2.9e-07	1.0e-06	1.4e-06
Sr-89	6.9e-06	7.6e-07	4.4e-06	1.6e-05	2.2e-05	1.4e-06	1.5e-07	8.7e-07	3.1e-06	4.3e-06
Sr-90	4.4e-04	5.4e-05	2.8e-04	1.0e-03	1.3e-03	8.6e-05	1.0e-05	5.6e-05	2.0e-04	2.6e-04
Y-91	5.6e-05	6.4e-06	3.6e-05	1.3e-04	1.7e-04	1.1e-05	1.3e-06	7.0e-06	2.6e-05	3.3e-05
Zr-93	1.5e-04	1.7e-05	9.6e-05	3.4e-04	4.5e-04	2.9e-05	3.5e-06	1.9e-05	6.6e-05	8.6e-05
Zr-95	2.3e-05	2.7e-06	1.5e-05	5.3e-05	7.0e-05	4.5e-06	5.4e-07	2.9e-06	1.0e-05	1.3e-05
Nb-93m	5.1e-05	6.5e-06	3.4e-05	1.2e-04	1.5e-04	1.0e-05	1.3e-06	6.6e-06	2.3e-05	3.0e-05
Nb-94	7.3e-04	9.2e-05	4.8e-04	1.7e-03	2.2e-03	1.4e-04	1.8e-05	9.4e-05	3.3e-04	4.3e-04
Nb-95	5.0e-06	5.3e-07	3.1e-06	1.2e-05	1.6e-05	9.8e-07	1.0e-07	6.2e-07	2.3e-06	3.1e-06
Mo-93	1.1e-05	1.2e-06	7.0e-06	2.5e-05	3.4e-05	2.2e-06	2.4e-07	1.4e-06	5.0e-06	6.7e-06
Tc-97	3.8e-07	4.2e-08	2.4e-07	8.8e-07	1.2e-06	7.5e-08	8.4e-09	4.8e-08	1.7e-07	2.3e-07
Tc-97m	1.4e-06	1.5e-07	8.8e-07	3.3e-06	4.3e-06	2.7e-07	3.1e-08	1.7e-07	6.4e-07	8.3e-07
Tc-99	3.2e-06	3.6e-07	2.0e-06	7.4e-06	9.8e-06	6.3e-07	7.0e-08	4.0e-07	1.5e-06	1.9e-06
Ru-103	1.8e-06	1.8e-07	1.1e-06	4.1e-06	5.7e-06	3.5e-07	3.6e-08	2.2e-07	8.1e-07	1.1e-06
Ru-106	1.7e-04	1.9e-05	1.1e-04	3.9e-04	5.2e-04	3.3e-05	3.8e-06	2.1e-05	7.6e-05	1.0e-04
Ag-108m	1.4e-04	1.4e-05	8.5e-05	3.3e-04	4.5e-04	2.7e-05	2.8e-06	1.7e-05	6.5e-05	8.8e-05
Ag-110m	1.6e-04	1.7e-05	1.0e-04	3.9e-04	5.3e-04	3.2e-05	3.4e-06	2.0e-05	7.6e-05	1.0e-04
Cd-109	1.5e-03	2.0e-04	1.0e-03	3.5e-03	4.5e-03	3.0e-04	4.0e-05	2.0e-04	6.8e-04	8.7e-04
Sn-113	3.3e-06	3.7e-07	2.1e-06	7.5e-06	1.0e-05	6.5e-07	7.3e-08	4.1e-07	1.5e-06	2.0e-06
Sb-124	6.2e-05	5.9e-06	3.8e-05	1.5e-04	2.0e-04	1.2e-05	1.2e-06	7.4e-06	2.9e-05	3.9e-05
Sb-125	5.1e-05	5.2e-06	3.2e-05	1.2e-04	1.6e-04	1.0e-05	1.0e-06	6.2e-06	2.3e-05	3.2e-05
Te-123m	2.9e-04	3.8e-05	1.9e-04	6.6e-04	8.5e-04	5.7e-05	7.5e-06	3.8e-05	1.3e-04	1.6e-04
Te-127m	5.9e-04	7.6e-05	3.8e-04	1.3e-03	1.7e-03	1.2e-04	1.5e-05	7.7e-05	2.6e-04	3.3e-04
I-125	1.4e-04	1.1e-05	7.8e-05	3.2e-04	4.5e-04	2.7e-05	2.2e-06	1.5e-05	6.3e-05	8.9e-05
I-129	1.5e-03	1.2e-04	8.8e-04	3.6e-03	5.0e-03	2.9e-04	2.5e-05	1.7e-04	7.0e-04	9.7e-04
I-131	2.3e-05	3.0e-07	5.7e-06	5.8e-05	1.0e-04	4.5e-06	5.9e-08	1.1e-06	1.1e-05	2.0e-05
Cs-134	1.6e-03	2.1e-04	1.0e-03	3.5e-03	4.5e-03	3.1e-04	4.1e-05	2.1e-04	7.0e-04	8.9e-04
Cs-135	1.6e-04	2.1e-05	1.1e-04	3.6e-04	4.6e-04	3.1e-05	4.2e-06	2.1e-05	7.1e-05	9.1e-05
Cs-137	1.1e-03	1.5e-04	7.5e-04	2.5e-03	3.2e-03	2.2e-04	2.9e-05	1.5e-04	5.0e-04	6.4e-04
Ba-133	1.4e-05	1.7e-06	8.8e-06	3.1e-05	4.2e-05	2.7e-06	3.3e-07	1.7e-06	6.2e-06	8.2e-06
Ce-139	1.3e-05	1.6e-06	8.5e-06	3.0e-05	4.0e-05	2.6e-06	3.1e-07	1.7e-06	6.0e-06	7.8e-06
Ce-141	7.4e-06	7.4e-07	4.6e-06	1.7e-05	2.3e-05	1.4e-06	1.5e-07	9.0e-07	3.3e-06	4.5e-06
Ce-144	6.0e-04	7.2e-05	3.9e-04	1.4e-03	1.8e-03	1.2e-04	1.4e-05	7.6e-05	2.7e-04	3.5e-04
Pm-147	6.8e-05	8.2e-06	4.4e-05	1.6e-04	2.0e-04	1.3e-05	1.6e-06	8.7e-06	3.1e-05	3.9e-05

Table F1.20 Normalized effective dose equivalents from Inhalation: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.3e-05	6.4e-06	3.5e-05	1.2e-04	1.6e-04	1.0e-05	1.3e-06	6.9e-06	2.3e-05	3.1e-05
Eu-152	3.9e-04	4.7e-05	2.5e-04	8.9e-04	1.2e-03	7.6e-05	9.5e-06	5.0e-05	1.7e-04	2.3e-04
Eu-154	5.0e-04	6.1e-05	3.2e-04	1.1e-03	1.5e-03	9.9e-05	1.2e-05	6.4e-05	2.2e-04	3.0e-04
Eu-155	7.2e-05	8.8e-06	4.7e-05	1.7e-04	2.2e-04	1.4e-05	1.8e-06	9.2e-06	3.2e-05	4.3e-05
Gd-153	1.5e-05	1.9e-06	9.6e-06	3.5e-05	4.5e-05	2.9e-06	3.7e-07	1.9e-06	6.8e-06	8.7e-06
Tb-160	3.1e-05	3.6e-06	2.0e-05	7.0e-05	9.3e-05	6.1e-06	7.0e-07	3.9e-06	1.4e-05	1.8e-05
Tm-170	3.8e-05	4.6e-06	2.5e-05	8.7e-05	1.2e-04	7.5e-06	9.0e-07	4.9e-06	1.7e-05	2.3e-05
Tm-171	1.6e-05	1.9e-06	1.0e-05	3.6e-05	4.7e-05	3.1e-06	3.8e-07	2.0e-06	7.1e-06	9.3e-06
Ta-182	6.3e-05	7.4e-06	4.1e-05	1.5e-04	1.9e-04	1.2e-05	1.5e-06	8.1e-06	2.8e-05	3.6e-05
W-181	4.7e-08	5.4e-09	2.9e-08	1.1e-07	1.5e-07	9.2e-09	1.1e-09	5.9e-09	2.1e-08	2.9e-08
W-185	2.0e-07	2.3e-08	1.3e-07	4.7e-07	6.4e-07	4.0e-08	4.5e-09	2.5e-08	9.3e-08	1.3e-07
Os-185	2.6e-04	3.3e-05	1.7e-04	5.9e-04	7.5e-04	5.1e-05	6.6e-06	3.4e-05	1.1e-04	1.5e-04
Ir-192	7.6e-06	8.6e-07	4.8e-06	1.8e-05	2.4e-05	1.5e-06	1.7e-07	9.6e-07	3.5e-06	4.7e-06
Tl-204	8.1e-05	1.1e-05	5.4e-05	1.8e-04	2.4e-04	1.6e-05	2.1e-06	1.1e-05	3.6e-05	4.6e-05
Pb-210	7.6e-01	1.0e-01	5.1e-01	1.7e+00	2.2e+00	1.5e-01	2.0e-02	1.0e-01	3.4e-01	4.3e-01
Bi-207	6.8e-04	9.1e-05	4.6e-04	1.6e-03	2.0e-03	1.3e-04	1.8e-05	9.1e-05	3.0e-04	3.9e-04
Po-210	2.4e-01	3.2e-02	1.6e-01	5.5e-01	7.0e-01	4.8e-02	6.3e-03	3.2e-02	1.1e-01	1.4e-01
Ra-226	1.5e-02	1.8e-03	9.9e-03	3.5e-02	4.6e-02	3.0e-03	3.7e-04	2.0e-03	6.9e-03	9.1e-03
Ra-228	3.1e-02	3.3e-03	1.9e-02	7.3e-02	1.0e-01	6.1e-03	6.6e-04	3.8e-03	1.4e-02	2.0e-02
Ac-227	2.3e+00	2.8e-01	1.5e+00	5.3e+00	6.9e+00	4.6e-01	5.5e-02	3.0e-01	1.0e+00	1.4e+00
Th-228	5.9e-01	7.3e-02	3.8e-01	1.3e+00	1.7e+00	1.2e-01	1.4e-02	7.5e-02	2.6e-01	3.4e-01
Th-229	3.1e+00	3.8e-01	2.0e+00	7.1e+00	9.2e+00	6.1e-01	7.6e-02	4.0e-01	1.4e+00	1.8e+00
Th-230	4.6e-01	5.7e-02	3.0e-01	1.1e+00	1.4e+00	9.1e-02	1.1e-02	6.0e-02	2.1e-01	2.7e-01
Th-232	2.0e+00	2.5e-01	1.3e+00	4.7e+00	6.1e+00	4.0e-01	5.0e-02	2.6e-01	9.1e-01	1.2e+00
Pa-231	1.5e+00	1.8e-01	1.0e+00	3.5e+00	4.5e+00	3.0e-01	3.7e-02	2.0e-01	6.8e-01	8.9e-01
U-232	1.2e+00	1.5e-01	7.7e-01	2.7e+00	3.6e+00	2.3e-01	2.9e-02	1.5e-01	5.3e-01	6.9e-01
U-233	2.4e-01	2.9e-02	1.6e-01	5.5e-01	7.2e-01	4.7e-02	5.8e-03	3.1e-02	1.1e-01	1.4e-01
U-234	2.3e-01	2.9e-02	1.5e-01	5.4e-01	7.0e-01	4.6e-02	5.7e-03	3.0e-02	1.1e-01	1.4e-01
U-235	2.2e-01	2.7e-02	1.4e-01	5.0e-01	6.5e-01	4.3e-02	5.3e-03	2.8e-02	9.8e-02	1.3e-01
U-236	2.2e-01	2.7e-02	1.4e-01	5.1e-01	6.6e-01	4.3e-02	5.4e-03	2.9e-02	1.0e-01	1.3e-01
U-238	2.1e-01	2.6e-02	1.4e-01	4.8e-01	6.3e-01	4.1e-02	5.1e-03	2.7e-02	9.5e-02	1.2e-01
Np-237	9.6e-01	1.1e-01	6.2e-01	2.2e+00	2.9e+00	1.9e-01	2.3e-02	1.2e-01	4.3e-01	5.6e-01
Pu-236	2.2e-01	2.7e-02	1.4e-01	5.2e-01	6.7e-01	4.4e-02	5.4e-03	2.9e-02	1.0e-01	1.3e-01
Pu-238	5.1e-01	6.2e-02	3.3e-01	1.2e+00	1.5e+00	1.0e-01	1.2e-02	6.5e-02	2.3e-01	3.0e-01
Pu-239	5.4e-01	6.6e-02	3.5e-01	1.3e+00	1.6e+00	1.1e-01	1.3e-02	7.0e-02	2.5e-01	3.2e-01
Pu-240	5.4e-01	6.6e-02	3.5e-01	1.3e+00	1.6e+00	1.1e-01	1.3e-02	7.0e-02	2.5e-01	3.2e-01
Pu-241	9.8e-03	1.1e-03	5.7e-03	2.1e-02	2.7e-02	1.7e-03	2.1e-04	1.1e-03	4.0e-03	5.2e-03
Pu-242	5.2e-01	6.3e-02	3.3e-01	1.2e+00	1.6e+00	1.0e-01	1.2e-02	6.6e-02	2.3e-01	3.1e-01
Pu-244	5.1e-01	6.2e-02	3.3e-01	1.2e+00	1.5e+00	1.0e-01	1.2e-02	6.6e-02	2.3e-01	3.0e-01
Am-241	7.8e-01	9.4e-02	5.0e-01	1.8e+00	2.3e+00	1.5e-01	1.8e-02	1.0e-01	3.5e-01	4.6e-01
Am-242m	7.7e-01	9.3e-02	5.0e-01	1.8e+00	2.3e+00	1.5e-01	1.8e-02	9.9e-02	3.4e-01	4.6e-01
Am-243	7.7e-01	9.3e-02	5.0e-01	1.8e+00	2.3e+00	1.5e-01	1.8e-02	9.9e-02	3.5e-01	4.6e-01
Cm-242	2.6e-02	3.2e-03	1.7e-02	6.1e-02	7.9e-02	5.2e-03	6.3e-04	3.3e-03	1.2e-02	1.6e-02
Cm-243	5.4e-01	6.6e-02	3.5e-01	1.3e+00	1.6e+00	1.1e-01	1.3e-02	6.8e-02	2.5e-01	3.2e-01
Cm-244	4.4e-01	5.3e-02	2.8e-01	1.0e+00	1.3e+00	8.6e-02	1.0e-02	5.5e-02	2.0e-01	2.6e-01
Cm-245	8.0e-01	9.8e-02	5.1e-01	1.9e+00	2.4e+00	1.6e-01	1.9e-02	1.0e-01	3.7e-01	4.8e-01
Cm-246	8.0e-01	9.7e-02	5.1e-01	1.9e+00	2.4e+00	1.6e-01	1.9e-02	1.0e-01	3.7e-01	4.7e-01
Cm-247	7.3e-01	8.9e-02	4.7e-01	1.7e+00	2.2e+00	1.4e-01	1.8e-02	9.3e-02	3.4e-01	4.3e-01
Cm-248	2.9e+00	3.6e-01	1.9e+00	6.8e+00	8.8e+00	5.7e-01	7.0e-02	3.7e-01	1.3e+00	1.7e+00
Bk-249	2.4e-03	3.0e-04	1.5e-03	5.5e-03	7.1e-03	4.7e-04	5.8e-05	3.0e-04	1.1e-03	1.4e-03
Cf-248	8.4e-02	1.0e-02	5.4e-02	1.9e-01	2.5e-01	1.7e-02	2.0e-03	1.1e-02	3.8e-02	4.9e-02
Cf-249	6.7e-01	8.2e-02	4.4e-01	1.5e+00	2.0e+00	1.3e-01	1.6e-02	8.7e-02	3.0e-01	3.9e-01
Cf-250	3.6e-01	4.4e-02	2.3e-01	8.3e-01	1.1e+00	7.1e-02	8.7e-03	4.7e-02	1.6e-01	2.1e-01
Cf-251	6.8e-01	8.4e-02	4.5e-01	1.6e+00	2.0e+00	1.3e-01	1.7e-02	8.8e-02	3.1e-01	4.0e-01
Cf-252	2.7e-01	3.3e-02	1.7e-01	6.1e-01	8.0e-01	5.3e-02	6.5e-03	3.5e-02	1.2e-01	1.6e-01
Cf-254	3.4e-01	3.9e-02	2.2e-01	7.7e-01	1.0e+00	6.6e-02	7.8e-03	4.3e-02	1.5e-01	2.0e-01
Es-254	6.9e-02	8.1e-03	4.5e-02	1.6e-01	2.1e-01	1.3e-02	1.6e-03	8.8e-03	3.1e-02	4.1e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.21 Normalized effective dose equivalents from ingestion: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	6.7e-04	3.1e-05	3.7e-04	1.7e-03	2.3e-03	1.3e-04	6.1e-06	7.4e-05	3.3e-04	4.4e-04
P-32	6.5e-06	1.6e-07	2.6e-06	1.6e-05	2.7e-05	1.3e-06	3.4e-08	5.2e-07	3.2e-06	5.4e-06
S-35	1.2e-06	4.8e-08	6.2e-07	2.9e-06	4.0e-06	2.3e-07	9.9e-09	1.2e-07	5.7e-07	7.9e-07
Cl-36	8.7e-05	3.2e-06	4.5e-05	2.2e-04	3.2e-04	1.7e-05	6.4e-07	8.9e-06	4.4e-05	6.3e-05
K-40	1.1e-03	5.2e-05	6.1e-04	2.7e-03	3.8e-03	2.2e-04	1.0e-05	1.2e-04	5.4e-04	7.5e-04
Ca-41	7.5e-06	3.4e-07	4.1e-06	1.9e-05	2.6e-05	1.5e-06	6.6e-08	8.1e-07	3.7e-06	5.2e-06
Ca-45	1.6e-05	7.2e-07	8.6e-06	4.0e-05	5.4e-05	3.1e-06	1.4e-07	1.7e-06	7.8e-06	1.1e-05
Sc-46	2.8e-05	1.2e-06	1.5e-05	7.0e-05	9.7e-05	5.4e-06	2.4e-07	3.0e-06	1.4e-05	1.9e-05
Cr-51	1.5e-07	5.8e-09	7.5e-08	3.9e-07	5.7e-07	3.0e-08	1.2e-09	1.5e-08	7.6e-08	1.1e-07
Mn-53	4.6e-07	2.1e-08	2.5e-07	1.1e-06	1.6e-06	9.0e-08	4.2e-09	5.0e-08	2.2e-07	3.0e-07
Mn-54	1.1e-05	5.1e-07	5.9e-06	2.7e-05	3.7e-05	2.1e-06	9.7e-08	1.2e-06	5.2e-06	7.2e-06
Fe-55	7.5e-07	3.2e-08	4.0e-07	1.9e-06	2.6e-06	1.5e-07	6.4e-09	7.9e-08	3.7e-07	5.2e-07
Fe-59	4.8e-06	1.9e-07	2.5e-06	1.2e-05	1.7e-05	9.5e-07	3.7e-08	4.9e-07	2.4e-06	3.4e-06
Co-56	9.2e-06	3.9e-07	4.8e-06	2.3e-05	3.3e-05	1.8e-06	7.9e-08	9.6e-07	4.5e-06	6.3e-06
Co-57	8.6e-07	3.6e-08	4.5e-07	2.2e-06	3.0e-06	1.7e-07	7.2e-09	8.9e-08	4.3e-07	5.9e-07
Co-58	2.6e-06	1.1e-07	1.4e-06	6.6e-06	9.4e-06	5.2e-07	2.2e-08	2.7e-07	1.3e-06	1.8e-06
Co-60	1.3e-05	5.5e-07	6.8e-06	3.2e-05	4.5e-05	2.5e-06	1.1e-07	1.3e-06	6.4e-06	8.9e-06
Ni-59	2.7e-07	1.2e-08	1.4e-07	6.7e-07	9.4e-07	5.2e-08	2.4e-09	2.8e-08	1.3e-07	1.8e-07
Ni-63	7.3e-07	3.3e-08	3.9e-07	1.8e-06	2.6e-06	1.4e-07	6.5e-09	7.8e-08	3.6e-07	5.1e-07
Zn-65	1.4e-03	6.6e-05	7.9e-04	3.5e-03	4.9e-03	2.8e-04	1.3e-05	1.6e-04	7.0e-04	9.4e-04
As-73	1.9e-05	8.1e-07	1.0e-05	4.8e-05	6.4e-05	3.7e-06	1.6e-07	2.0e-06	9.3e-06	1.3e-05
Se-75	8.8e-04	4.1e-05	4.9e-04	2.2e-03	3.0e-03	1.7e-04	8.2e-06	9.7e-05	4.3e-04	5.9e-04
Sr-85	7.8e-06	3.5e-07	4.2e-06	2.0e-05	2.7e-05	1.5e-06	7.1e-08	8.2e-07	3.8e-06	5.3e-06
Sr-89	3.3e-05	1.5e-06	1.7e-05	8.3e-05	1.1e-04	6.4e-06	2.9e-07	3.4e-06	1.6e-05	2.2e-05
Sr-90	9.0e-04	4.0e-05	4.8e-04	2.3e-03	3.1e-03	1.8e-04	8.0e-06	9.7e-05	4.4e-04	6.0e-04
Y-91	3.6e-05	1.6e-06	1.9e-05	9.2e-05	1.3e-04	7.1e-06	3.3e-07	3.8e-06	1.8e-05	2.5e-05
Zr-93	9.7e-06	4.4e-07	5.3e-06	2.4e-05	3.3e-05	1.9e-06	8.7e-08	1.1e-06	4.7e-06	6.6e-06
Zr-95	2.1e-05	9.1e-07	1.1e-05	5.2e-05	7.1e-05	4.1e-06	1.9e-07	2.2e-06	1.0e-05	1.4e-05
Nb-93m	3.1e-06	1.3e-07	1.6e-06	7.6e-06	1.1e-05	6.0e-07	2.6e-08	3.3e-07	1.5e-06	2.1e-06
Nb-94	4.2e-05	1.9e-06	2.2e-05	1.0e-04	1.5e-04	8.3e-06	3.6e-07	4.5e-06	2.1e-05	2.9e-05
Nb-95	7.4e-06	3.0e-07	3.8e-06	1.9e-05	2.6e-05	1.5e-06	6.2e-08	7.6e-07	3.7e-06	5.1e-06
Mo-93	1.7e-06	7.5e-08	9.2e-07	4.4e-06	6.0e-06	3.4e-07	1.5e-08	1.8e-07	8.6e-07	1.2e-06
Tc-97	2.2e-07	9.2e-09	1.2e-07	5.6e-07	7.6e-07	4.3e-08	1.9e-09	2.3e-08	1.1e-07	1.5e-07
Tc-97m	1.2e-06	5.0e-08	6.4e-07	3.0e-06	4.2e-06	2.3e-07	9.9e-09	1.3e-07	6.0e-07	8.2e-07
Tc-99	1.9e-06	7.8e-08	1.0e-06	4.7e-06	6.5e-06	3.7e-07	1.6e-08	2.0e-07	9.4e-07	1.3e-06
Ru-103	2.0e-06	8.0e-08	1.0e-06	5.1e-06	7.3e-06	4.0e-07	1.6e-08	2.1e-07	9.9e-07	1.4e-06
Ru-106	3.2e-05	1.4e-06	1.7e-05	8.2e-05	1.1e-04	6.3e-06	2.8e-07	3.4e-06	1.6e-05	2.2e-05
Ag-108m	1.2e-04	4.5e-06	6.0e-05	3.0e-04	4.1e-04	2.3e-05	8.9e-07	1.2e-05	5.9e-05	8.1e-05
Ag-110m	1.5e-04	5.8e-06	7.8e-05	3.8e-04	5.2e-04	2.9e-05	1.1e-06	1.5e-05	7.5e-05	1.0e-04
Cd-109	1.5e-03	7.0e-05	8.3e-04	3.7e-03	5.1e-03	2.9e-04	1.4e-05	1.6e-04	7.3e-04	9.9e-04
Sn-113	3.3e-06	1.4e-07	1.8e-06	8.2e-06	1.2e-05	6.4e-07	2.7e-08	3.5e-07	1.6e-06	2.3e-06
Sb-124	8.4e-05	3.1e-06	4.2e-05	2.1e-04	3.2e-04	1.6e-05	6.1e-07	8.2e-06	4.2e-05	6.2e-05
Sb-125	4.5e-05	1.7e-06	2.3e-05	1.1e-04	1.6e-04	8.8e-06	3.4e-07	4.5e-06	2.2e-05	3.2e-05
Te-123m	5.2e-04	2.4e-05	2.9e-04	1.3e-03	1.8e-03	1.0e-04	4.8e-06	5.7e-05	2.5e-04	3.4e-04
Te-127m	8.0e-04	3.7e-05	4.5e-04	2.0e-03	2.7e-03	1.6e-04	7.4e-06	8.8e-05	3.9e-04	5.3e-04
I-125	7.2e-04	2.3e-05	3.6e-04	1.8e-03	2.7e-03	1.4e-04	4.5e-06	7.0e-05	3.5e-04	5.3e-04
I-129	7.9e-03	2.6e-04	4.0e-03	2.0e-02	2.9e-02	1.5e-03	5.2e-05	7.9e-04	3.9e-03	5.7e-03
I-131	1.2e-04	7.5e-07	2.5e-05	3.1e-04	5.7e-04	2.4e-05	1.5e-07	4.9e-06	6.3e-05	1.1e-04
Cs-134	8.3e-03	3.9e-04	4.6e-03	2.1e-02	2.8e-02	1.6e-03	7.7e-05	9.1e-04	4.1e-03	5.5e-03
Cs-135	8.3e-04	3.9e-05	4.6e-04	2.1e-03	2.8e-03	1.6e-04	7.6e-06	9.1e-05	4.1e-04	5.5e-04
Cs-137	5.8e-03	2.7e-04	3.2e-03	1.5e-02	2.0e-02	1.1e-03	5.3e-05	6.4e-04	2.9e-03	3.9e-03
Ba-133	2.0e-05	9.1e-07	1.1e-05	5.0e-05	6.8e-05	3.9e-06	1.8e-07	2.1e-06	9.9e-06	1.3e-05
Ce-139	5.6e-06	2.5e-07	3.0e-06	1.4e-05	1.9e-05	1.1e-06	4.9e-08	5.9e-07	2.8e-06	3.7e-06
Ce-141	8.0e-06	3.2e-07	4.1e-06	2.0e-05	2.8e-05	1.6e-06	6.2e-08	8.1e-07	3.9e-06	5.6e-06
Ce-144	1.1e-04	5.1e-06	6.1e-05	2.9e-04	3.9e-04	2.2e-05	1.0e-06	1.2e-05	5.6e-05	7.6e-05
Pm-147	8.1e-06	2.7e-07	3.3e-06	1.5e-05	2.1e-05	1.2e-06	5.4e-08	6.4e-07	3.0e-06	4.1e-06

Table F1.21 Normalized effective dose equivalents from ingestion: Processing EAF dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.3e-06	1.0e-07	1.3e-06	5.6e-06	7.9e-06	4.5e-07	2.0e-08	2.5e-07	1.1e-06	1.6e-06
Eu-152	3.8e-05	1.7e-06	2.1e-05	9.4e-05	1.3e-04	7.4e-06	3.3e-07	4.0e-06	1.9e-05	2.6e-05
Eu-154	5.6e-05	2.5e-06	3.0e-05	1.4e-04	1.9e-04	1.1e-05	4.9e-07	6.0e-06	2.7e-05	3.8e-05
Eu-155	8.8e-06	4.0e-07	4.8e-06	2.2e-05	3.1e-05	1.7e-06	7.8e-08	9.5e-07	4.3e-06	6.0e-06
Gd-153	6.2e-06	2.8e-07	3.3e-06	1.5e-05	2.1e-05	1.2e-06	5.6e-08	6.6e-07	3.0e-06	4.1e-06
Tb-160	2.8e-05	1.3e-06	1.5e-05	7.1e-05	9.8e-05	5.5e-06	2.6e-07	2.9e-06	1.4e-05	1.9e-05
Tm-170	2.6e-05	1.1e-06	1.4e-05	6.5e-05	8.9e-05	5.0e-06	2.2e-07	2.8e-06	1.3e-05	1.7e-05
Tm-171	2.5e-06	1.1e-07	1.3e-06	6.2e-06	8.6e-06	4.8e-07	2.1e-08	2.6e-07	1.2e-06	1.7e-06
Ta-182	3.1e-05	1.4e-06	1.7e-05	7.7e-05	1.1e-04	6.0e-06	2.7e-07	3.4e-06	1.5e-05	2.1e-05
W-181	3.0e-07	1.3e-08	1.6e-07	7.4e-07	1.1e-06	5.8e-08	2.7e-09	3.1e-08	1.5e-07	2.1e-07
W-185	1.4e-06	6.4e-08	7.6e-07	3.6e-06	5.2e-06	2.8e-07	1.2e-08	1.5e-07	7.2e-07	1.0e-06
Os-185	2.0e-04	9.0e-06	1.1e-04	4.9e-04	6.6e-04	3.8e-05	1.8e-06	2.1e-05	9.6e-05	1.3e-04
Ir-192	5.2e-06	2.2e-07	2.7e-06	1.3e-05	1.8e-05	1.0e-06	4.4e-08	5.4e-07	2.5e-06	3.6e-06
Tl-204	3.8e-04	1.8e-05	2.1e-04	9.4e-04	1.3e-03	7.4e-05	3.5e-06	4.2e-05	1.9e-04	2.5e-04
Pb-210	8.3e-01	3.9e-02	4.6e-01	2.1e+00	2.8e+00	1.6e-01	7.6e-03	9.1e-02	4.1e-01	5.5e-01
Bi-207	6.2e-04	3.0e-05	3.5e-04	1.6e-03	2.1e-03	1.2e-04	5.7e-06	6.9e-05	3.1e-04	4.1e-04
Po-210	1.8e-01	8.4e-03	9.9e-02	4.5e-01	6.2e-01	3.5e-02	1.7e-03	2.0e-02	8.8e-02	1.2e-01
Ra-226	7.9e-03	3.5e-04	4.3e-03	2.0e-02	2.8e-02	1.6e-03	7.0e-05	8.4e-04	3.9e-03	5.4e-03
Ra-228	8.6e-03	3.8e-04	4.6e-03	2.2e-02	3.0e-02	1.7e-03	7.5e-05	9.1e-04	4.2e-03	5.8e-03
Ac-227	8.7e-02	3.9e-03	4.8e-02	2.2e-01	3.0e-01	1.7e-02	7.8e-04	9.3e-03	4.3e-02	5.9e-02
Th-228	4.6e-03	2.0e-04	2.6e-03	1.2e-02	1.6e-02	9.0e-04	4.1e-05	5.0e-04	2.3e-03	3.2e-03
Th-229	2.4e-02	1.0e-03	1.3e-02	6.0e-02	8.3e-02	4.7e-03	2.2e-04	2.6e-03	1.2e-02	1.6e-02
Th-230	3.2e-03	1.4e-04	1.8e-03	8.1e-03	1.1e-02	6.4e-04	2.9e-05	3.6e-04	1.6e-03	2.2e-03
Th-232	1.6e-02	7.1e-04	9.0e-03	4.1e-02	5.7e-02	3.2e-03	1.5e-04	1.8e-03	8.0e-03	1.1e-02
Pa-231	6.3e-02	2.9e-03	3.5e-02	1.6e-01	2.2e-01	1.2e-02	5.7e-04	6.7e-03	3.2e-02	4.3e-02
U-232	5.8e-04	2.7e-05	3.1e-04	1.5e-03	2.1e-03	1.1e-04	5.2e-06	6.3e-05	2.9e-04	4.0e-04
U-233	1.6e-04	7.2e-06	8.4e-05	3.9e-04	5.4e-04	3.1e-05	1.4e-06	1.7e-05	7.7e-05	1.1e-04
U-234	1.5e-04	7.1e-06	8.3e-05	3.9e-04	5.3e-04	3.0e-05	1.4e-06	1.7e-05	7.6e-05	1.0e-04
U-235	1.7e-04	7.6e-06	8.9e-05	4.2e-04	5.7e-04	3.2e-05	1.5e-06	1.8e-05	8.1e-05	1.1e-04
U-236	1.5e-04	6.7e-06	7.9e-05	3.7e-04	5.0e-04	2.9e-05	1.3e-06	1.6e-05	7.1e-05	9.9e-05
U-238	2.2e-04	1.0e-05	1.2e-04	5.6e-04	7.6e-04	4.3e-05	2.0e-06	2.4e-05	1.1e-04	1.5e-04
Np-237	2.6e-02	1.2e-03	1.4e-02	6.7e-02	9.1e-02	5.2e-03	2.4e-04	2.8e-03	1.3e-02	1.8e-02
Pu-236	6.7e-03	3.1e-04	3.6e-03	1.7e-02	2.3e-02	1.3e-03	6.2e-05	7.2e-04	3.3e-03	4.5e-03
Pu-238	1.9e-02	8.6e-04	1.0e-02	4.7e-02	6.5e-02	3.7e-03	1.7e-04	2.0e-03	9.3e-03	1.3e-02
Pu-239	2.1e-02	9.6e-04	1.1e-02	5.2e-02	7.2e-02	4.1e-03	1.9e-04	2.2e-03	1.0e-02	1.4e-02
Pu-240	2.1e-02	9.6e-04	1.1e-02	5.2e-02	7.2e-02	4.1e-03	1.9e-04	2.2e-03	1.0e-02	1.4e-02
Pu-241	4.0e-04	1.9e-05	2.2e-04	1.0e-03	1.4e-03	8.0e-05	3.7e-06	4.3e-05	2.0e-04	2.7e-04
Pu-242	2.0e-02	9.1e-04	1.1e-02	4.9e-02	6.8e-02	3.9e-03	1.8e-04	2.1e-03	9.7e-03	1.3e-02
Pu-244	2.0e-02	9.0e-04	1.1e-02	4.9e-02	6.7e-02	3.8e-03	1.8e-04	2.1e-03	9.6e-03	1.3e-02
Am-241	2.1e-02	9.9e-04	1.1e-02	5.3e-02	7.4e-02	4.2e-03	1.9e-04	2.3e-03	1.0e-02	1.5e-02
Am-242m	2.1e-02	9.9e-04	1.1e-02	5.2e-02	7.4e-02	4.1e-03	1.9e-04	2.3e-03	1.0e-02	1.5e-02
Am-243	2.1e-02	9.9e-04	1.1e-02	5.3e-02	7.4e-02	4.2e-03	1.9e-04	2.3e-03	1.0e-02	1.5e-02
Cm-242	5.9e-04	2.6e-05	3.2e-04	1.5e-03	2.1e-03	1.2e-04	5.2e-06	6.3e-05	3.0e-04	4.1e-04
Cm-243	1.5e-02	6.6e-04	8.1e-03	3.8e-02	5.2e-02	2.9e-03	1.3e-04	1.6e-03	7.4e-03	1.0e-02
Cm-244	1.2e-02	5.3e-04	6.5e-03	3.0e-02	4.2e-02	2.3e-03	1.0e-04	1.3e-03	6.0e-03	8.2e-03
Cm-245	2.2e-02	9.8e-04	1.2e-02	5.6e-02	7.8e-02	4.3e-03	1.9e-04	2.4e-03	1.1e-02	1.5e-02
Cm-246	2.2e-02	9.7e-04	1.2e-02	5.6e-02	7.7e-02	4.3e-03	1.9e-04	2.3e-03	1.1e-02	1.5e-02
Cm-247	2.0e-02	9.0e-04	1.1e-02	5.1e-02	7.1e-02	4.0e-03	1.8e-04	2.2e-03	1.0e-02	1.4e-02
Cm-248	8.0e-02	3.6e-03	4.4e-02	2.0e-01	2.8e-01	1.6e-02	7.0e-04	8.6e-03	4.0e-02	5.5e-02
Bk-249	7.1e-05	3.1e-06	3.8e-05	1.8e-04	2.4e-04	1.4e-05	6.2e-07	7.6e-06	3.5e-05	4.8e-05
Cf-248	1.9e-03	8.4e-05	1.0e-03	4.7e-03	6.4e-03	3.7e-04	1.7e-05	2.0e-04	9.3e-04	1.3e-03
Cf-249	2.8e-02	1.3e-03	1.5e-02	7.0e-02	9.6e-02	5.5e-03	2.5e-04	3.0e-03	1.4e-02	1.9e-02
Cf-250	1.2e-02	5.6e-04	6.8e-03	3.1e-02	4.3e-02	2.5e-03	1.1e-04	1.3e-03	6.3e-03	8.4e-03
Cf-251	2.9e-02	1.3e-03	1.5e-02	7.2e-02	9.8e-02	5.6e-03	2.5e-04	3.1e-03	1.4e-02	1.9e-02
Cf-252	6.2e-03	2.8e-04	3.4e-03	1.6e-02	2.1e-02	1.2e-03	5.5e-05	6.7e-04	3.1e-03	4.2e-03
Cf-254	9.3e-03	4.0e-04	5.0e-03	2.3e-02	3.2e-02	1.8e-03	8.0e-05	9.9e-04	4.7e-03	6.3e-03
Es-254	1.8e-03	8.1e-05	9.6e-04	4.4e-03	6.2e-03	3.5e-04	1.6e-05	1.9e-04	8.7e-04	1.2e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.22 Normalized effective dose equivalents from all pathways: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+01	1.4e+00	6.2e+00	2.2e+01	3.3e+01	2.2e+00	2.8e-01	1.2e+00	4.3e+00	6.7e+00
P-32	1.2e-03	2.3e-07	3.5e-05	2.8e-03	5.8e-03	2.3e-04	4.6e-08	6.9e-06	5.6e-04	1.1e-03
S-35	1.6e-04	1.4e-05	8.1e-05	3.3e-04	5.2e-04	3.1e-05	2.8e-06	1.6e-05	6.5e-05	1.0e-04
Cl-36	2.0e-03	1.7e-04	1.0e-03	4.1e-03	6.4e-03	4.0e-04	3.4e-05	2.0e-04	8.2e-04	1.3e-03
K-40	9.8e-01	1.2e-01	5.4e-01	1.9e+00	2.9e+00	1.9e-01	2.4e-02	1.1e-01	3.7e-01	5.8e-01
Ca-41	5.9e-04	5.3e-05	3.0e-04	1.2e-03	1.9e-03	1.2e-04	1.1e-05	6.0e-05	2.3e-04	3.7e-04
Ca-45	1.1e-03	1.2e-04	6.1e-04	2.3e-03	3.7e-03	2.3e-04	2.3e-05	1.2e-04	4.6e-04	7.3e-04
Sc-46	8.6e+00	8.2e-01	4.4e+00	1.8e+01	2.8e+01	1.7e+00	1.5e-01	8.7e-01	3.6e+00	5.6e+00
Cr-51	1.1e-02	9.0e-05	2.1e-03	2.6e-02	4.8e-02	2.2e-03	1.8e-05	4.1e-04	5.2e-03	9.4e-03
Mn-53	8.2e-05	9.3e-06	4.5e-05	1.6e-04	2.5e-04	1.6e-05	1.9e-06	8.9e-06	3.2e-05	5.0e-05
Mn-54	6.1e+00	7.6e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.8e-01	2.4e+00	3.6e+00
Fe-55	8.7e-06	8.8e-07	4.5e-06	1.7e-05	2.8e-05	1.7e-06	1.3e-07	8.8e-07	3.4e-06	5.5e-06
Fe-59	7.7e-02	2.7e-03	2.7e-02	1.8e-01	2.9e-01	1.5e-02	5.3e-04	5.4e-03	3.6e-02	5.8e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.5e+00	1.1e-01	7.0e-01	3.3e+00	5.2e+00	2.9e-01	2.2e-02	1.4e-01	6.4e-01	1.0e+00
Sr-89	6.8e-03	3.7e-04	2.8e-03	1.6e-02	2.5e-02	1.3e-03	7.5e-05	5.6e-04	3.1e-03	4.9e-03
Sr-90	1.4e-01	1.8e-02	8.0e-02	2.8e-01	4.4e-01	2.8e-02	3.5e-03	1.6e-02	5.6e-02	8.7e-02
Y-91	2.2e-02	1.5e-03	9.9e-03	4.9e-02	7.7e-02	4.2e-03	2.9e-04	1.9e-03	9.5e-03	1.5e-02
Zr-93	9.3e-03	1.2e-03	5.1e-03	1.9e-02	2.8e-02	1.8e-03	2.3e-04	1.0e-03	3.7e-03	5.6e-03
Zr-95	5.0e+00	5.0e-01	2.6e+00	1.1e+01	1.6e+01	9.9e-01	1.0e-01	5.2e-01	2.1e+00	3.2e+00
Nb-93m	3.2e-03	4.0e-04	1.8e-03	6.5e-03	9.8e-03	6.3e-04	7.9e-05	3.5e-04	1.3e-03	1.9e-03
Nb-94	1.6e+01	2.1e+00	9.2e+00	3.2e+01	4.8e+01	3.2e+00	4.1e-01	1.8e+00	6.3e+00	9.8e+00
Nb-95	1.3e+00	3.2e-02	3.9e-01	3.1e+00	5.2e+00	2.5e-01	6.3e-03	7.7e-02	6.1e-01	1.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.8e-01	8.5e-03	7.3e-02	4.2e-01	6.8e-01	3.6e-02	1.7e-03	1.5e-02	8.4e-02	1.4e-01
Sb-125	1.1e-01	9.0e-03	5.7e-02	2.4e-01	3.6e-01	2.2e-02	1.8e-03	1.1e-02	4.7e-02	7.2e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.7e-03	6.8e-05	6.5e-04	3.7e-03	6.2e-03	3.3e-04	1.4e-05	1.3e-04	7.4e-04	1.2e-03
I-129	3.0e-02	1.7e-03	1.4e-02	6.3e-02	1.0e-01	5.8e-03	3.4e-04	2.7e-03	1.3e-02	2.0e-02
I-131	1.3e-02	1.4e-09	8.9e-06	1.9e-02	5.8e-02	2.5e-03	2.8e-10	1.8e-06	3.9e-03	1.1e-02
Cs-134	3.5e-01	3.2e-02	1.8e-01	7.2e-01	1.1e+00	6.8e-02	6.3e-03	3.5e-02	1.4e-01	2.2e-01
Cs-135	7.8e-05	5.0e-06	3.7e-05	1.6e-04	2.6e-04	1.5e-05	9.9e-07	7.3e-06	3.2e-05	5.1e-05
Cs-137	1.4e-01	1.3e-02	7.1e-02	2.9e-01	4.5e-01	2.7e-02	2.5e-03	1.4e-02	5.7e-02	8.7e-02
Ba-133	2.9e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Ce-139	4.1e-01	4.9e-02	2.3e-01	8.5e-01	1.3e+00	8.1e-02	9.8e-03	4.5e-02	1.7e-01	2.5e-01
Ce-141	5.2e-02	1.1e-03	1.4e-02	1.3e-01	2.2e-01	1.0e-02	2.1e-04	2.9e-03	2.5e-02	4.2e-02
Ce-144	3.9e-01	4.9e-02	2.2e-01	7.7e-01	1.2e+00	7.6e-02	9.8e-03	4.4e-02	1.5e-01	2.3e-01
Pm-147	4.1e-03	5.1e-04	2.3e-03	8.2e-03	1.2e-02	8.1e-04	1.0e-04	4.5e-04	1.6e-03	2.5e-03

Table F1.22 Normalized effective dose equivalents from all pathways: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.3e-03	4.0e-04	1.8e-03	6.5e-03	9.9e-03	6.4e-04	7.9e-05	3.6e-04	1.3e-03	2.0e-03
Eu-152	1.2e+01	1.5e+00	6.7e+00	2.8e+01	3.5e+01	2.3e+00	3.0e-01	1.3e+00	4.6e+00	7.1e+00
Eu-154	1.1e+01	1.5e+00	6.5e+00	2.2e+01	3.4e+01	2.2e+00	2.9e-01	1.3e+00	4.5e+00	6.9e+00
Eu-155	1.4e-01	1.8e-02	8.1e-02	2.8e-01	4.2e-01	2.8e-02	3.6e-03	1.6e-02	5.5e-02	8.5e-02
Gd-153	1.3e-01	1.7e-02	7.4e-02	2.6e-01	4.0e-01	2.6e-02	3.3e-03	1.5e-02	5.2e-02	7.9e-02
Tb-160	4.1e+00	3.5e-01	2.0e+00	8.9e+00	1.4e+01	8.1e-01	6.9e-02	4.0e-01	1.7e+00	2.7e+00
Tm-170	8.7e-03	1.0e-03	4.8e-03	1.8e-02	2.7e-02	1.7e-03	2.1e-04	9.5e-04	3.5e-03	5.4e-03
Tm-171	1.5e-03	1.9e-04	8.3e-04	2.9e-03	4.4e-03	2.9e-04	3.8e-05	1.6e-04	5.7e-04	8.8e-04
Ta-182	6.6e+00	7.4e-01	3.6e+00	1.4e+01	2.1e+01	1.3e+00	1.5e-01	7.1e-01	2.7e+00	4.1e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.0e+01	2.6e+00	1.1e+01	3.9e+01	6.0e+01	3.9e+00	5.1e-01	2.2e+00	7.7e+00	1.2e+01
Ra-228	1.5e+01	1.9e+00	8.7e+00	3.1e+01	4.7e+01	3.1e+00	3.8e-01	1.7e+00	6.1e+00	9.5e+00
Ac-227	1.4e+02	1.8e+01	7.9e+01	2.9e+02	4.4e+02	2.8e+01	3.5e+00	1.6e+01	5.7e+01	8.7e+01
Th-228	4.6e+01	5.9e+00	2.6e+01	9.1e+01	1.4e+02	9.1e+00	1.2e+00	5.1e+00	1.8e+01	2.7e+01
Th-229	1.9e+02	2.3e+01	1.0e+02	3.7e+02	5.6e+02	3.6e+01	4.5e+00	2.0e+01	7.3e+01	1.1e+02
Th-230	2.7e+01	3.4e+00	1.5e+01	5.5e+01	8.4e+01	5.4e+00	6.6e-01	3.0e+00	1.1e+01	1.7e+01
Th-232	1.2e+02	1.5e+01	6.7e+01	2.4e+02	3.7e+02	2.4e+01	2.9e+00	1.3e+01	4.8e+01	7.3e+01
Pa-231	9.5e+01	1.2e+01	5.2e+01	1.9e+02	2.9e+02	1.9e+01	2.3e+00	1.0e+01	3.7e+01	5.7e+01
U-232	7.5e+01	9.1e+00	4.1e+01	1.5e+02	2.3e+02	1.5e+01	1.8e+00	8.0e+00	2.9e+01	4.5e+01
U-233	1.4e+01	1.7e+00	7.7e+00	2.8e+01	4.3e+01	2.8e+00	3.4e-01	1.5e+00	5.6e+00	8.6e+00
U-234	1.4e+01	1.7e+00	7.6e+00	2.8e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.4e+00	8.4e+00
U-235	1.4e+01	1.7e+00	7.6e+00	2.8e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.4e+00	8.2e+00
U-236	1.3e+01	1.6e+00	7.2e+00	2.6e+01	4.0e+01	2.6e+00	3.1e-01	1.4e+00	5.1e+00	7.9e+00
U-238	1.3e+01	1.6e+00	6.9e+00	2.5e+01	3.8e+01	2.5e+00	3.0e-01	1.4e+00	5.0e+00	7.6e+00
Np-237	6.0e+01	7.4e+00	3.3e+01	1.2e+02	1.8e+02	1.2e+01	1.4e+00	6.5e+00	2.3e+01	3.6e+01
Pu-236	1.3e+01	1.6e+00	7.2e+00	2.6e+01	3.9e+01	2.6e+00	3.1e-01	1.4e+00	5.2e+00	7.8e+00
Pu-238	3.1e+01	3.8e+00	1.7e+01	6.2e+01	9.4e+01	6.1e+00	7.5e-01	3.4e+00	1.2e+01	1.9e+01
Pu-239	3.3e+01	4.1e+00	1.8e+01	6.7e+01	1.0e+02	6.6e+00	8.1e-01	3.6e+00	1.3e+01	2.0e+01
Pu-240	3.3e+01	4.1e+00	1.8e+01	6.7e+01	1.0e+02	6.6e+00	8.1e-01	3.6e+00	1.3e+01	2.0e+01
Pu-241	5.6e-01	6.9e-02	3.0e-01	1.1e+00	1.7e+00	1.1e-01	1.4e-02	6.1e-02	2.2e-01	3.4e-01
Pu-242	3.2e+01	3.9e+00	1.7e+01	6.4e+01	9.7e+01	6.2e+00	7.7e-01	3.5e+00	1.3e+01	1.9e+01
Pu-244	3.5e+01	4.4e+00	1.9e+01	7.0e+01	1.1e+02	6.8e+00	8.6e-01	3.8e+00	1.4e+01	2.1e+01
Am-241	4.8e+01	5.8e+00	2.6e+01	9.6e+01	1.4e+02	9.4e+00	1.2e+00	5.2e+00	1.9e+01	2.9e+01
Am-242m	4.7e+01	5.8e+00	2.6e+01	9.5e+01	1.4e+02	9.3e+00	1.1e+00	5.1e+00	1.9e+01	2.9e+01
Am-243	4.8e+01	6.0e+00	2.7e+01	9.7e+01	1.5e+02	9.5e+00	1.2e+00	5.3e+00	1.9e+01	2.9e+01
Cm-242	1.2e+00	1.4e-01	6.4e-01	2.4e+00	3.6e+00	2.3e-01	2.7e-02	1.3e-01	4.6e-01	7.0e-01
Cm-243	3.3e+01	4.1e+00	1.8e+01	6.7e+01	1.0e+02	6.6e+00	8.1e-01	3.6e+00	1.3e+01	2.0e+01
Cm-244	2.6e+01	3.2e+00	1.4e+01	5.2e+01	8.0e+01	5.2e+00	6.3e-01	2.9e+00	1.0e+01	1.6e+01
Cm-245	4.9e+01	6.1e+00	2.7e+01	9.9e+01	1.5e+02	9.7e+00	1.2e+00	5.4e+00	1.9e+01	3.0e+01
Cm-246	4.8e+01	6.0e+00	2.6e+01	9.7e+01	1.5e+02	9.5e+00	1.2e+00	5.3e+00	1.9e+01	2.9e+01
Cm-247	4.7e+01	5.9e+00	2.6e+01	9.5e+01	1.4e+02	9.3e+00	1.2e+00	5.2e+00	1.9e+01	2.8e+01
Cm-248	1.8e+02	2.2e+01	9.7e+01	3.6e+02	5.4e+02	3.5e+01	4.3e+00	1.9e+01	7.0e+01	1.1e+02
Bk-249	1.4e-01	1.7e-02	7.7e-02	2.8e-01	4.3e-01	2.7e-02	3.4e-03	1.5e-02	5.5e-02	8.4e-02
Cf-248	4.5e+00	5.5e-01	2.5e+00	8.9e+00	1.3e+01	8.8e-01	1.1e-01	4.9e-01	1.8e+00	2.7e+00
Cf-249	4.4e+01	5.5e+00	2.4e+01	8.9e+01	1.3e+02	8.7e+00	1.1e+00	4.9e+00	1.7e+01	2.6e+01
Cf-250	2.2e+01	2.7e+00	1.2e+01	4.4e+01	6.6e+01	4.3e+00	5.3e-01	2.4e+00	8.6e+00	1.3e+01
Cf-251	4.3e+01	5.3e+00	2.4e+01	8.6e+01	1.3e+02	8.4e+00	1.0e+00	4.7e+00	1.7e+01	2.6e+01
Cf-252	1.5e+01	1.9e+00	8.4e+00	3.0e+01	4.6e+01	3.0e+00	3.7e-01	1.7e+00	6.1e+00	9.2e+00
Cf-254	6.5e+01	4.6e+00	3.0e+01	1.4e+02	2.3e+02	1.3e+01	9.2e-01	6.0e+00	2.8e+01	4.5e+01
Es-254	1.1e+01	1.4e+00	6.1e+00	2.1e+01	3.2e+01	2.1e+00	2.6e-01	1.2e+00	4.1e+00	6.4e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.23 Normalized effective dose equivalents from external exposure: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+01	1.4e+00	6.2e+00	2.2e+01	3.3e+01	2.2e+00	2.8e-01	1.2e+00	4.3e+00	6.7e+00
P-32	1.0e-03	2.0e-07	3.2e-05	2.5e-03	5.2e-03	2.0e-04	4.1e-08	6.2e-06	4.9e-04	1.0e-03
S-35	6.3e-06	6.0e-07	3.2e-06	1.3e-05	2.0e-05	1.2e-06	1.2e-07	6.3e-07	2.6e-06	4.0e-06
Cl-36	1.2e-03	1.0e-04	5.9e-04	2.4e-03	3.7e-03	2.3e-04	2.0e-05	1.2e-04	4.8e-04	7.4e-04
K-40	9.5e-01	1.2e-01	5.4e-01	1.9e+00	2.9e+00	1.9e-01	2.4e-02	1.1e-01	3.7e-01	5.7e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	6.8e-05	8.3e-06	3.8e-05	1.4e-04	2.1e-04	1.3e-05	1.7e-06	7.4e-06	2.7e-05	4.1e-05
Sc-46	8.6e+00	8.2e-01	4.4e+00	1.8e+01	2.8e+01	1.7e+00	1.6e-01	8.7e-01	3.6e+00	5.6e+00
Cr-51	1.1e-02	9.0e-05	2.1e-03	2.6e-02	4.8e-02	2.2e-03	1.8e-05	4.1e-04	5.1e-03	9.3e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.1e+00	7.6e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.8e-01	2.4e+00	3.6e+00
Fe-55	1.7e-11	1.6e-12	9.2e-12	3.4e-11	5.3e-11	3.3e-12	3.2e-13	1.8e-12	6.7e-12	1.0e-11
Fe-59	7.7e-02	2.7e-03	2.7e-02	1.8e-01	2.9e-01	1.5e-02	5.3e-04	5.4e-03	3.6e-02	5.8e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.5e+00	1.1e-01	7.0e-01	3.3e+00	5.2e+00	2.9e-01	2.2e-02	1.4e-01	6.4e-01	1.0e+00
Sr-89	5.8e-03	3.2e-04	2.4e-03	1.3e-02	2.1e-02	1.1e-03	6.3e-05	4.8e-04	2.6e-03	4.2e-03
Sr-90	6.4e-02	8.2e-03	3.6e-02	1.3e-01	1.9e-01	1.3e-02	1.6e-03	7.2e-03	2.5e-02	3.9e-02
Y-91	1.9e-02	1.3e-03	8.7e-03	4.3e-02	6.8e-02	3.8e-03	2.6e-04	1.7e-03	8.4e-03	1.3e-02
Zr-93	8.7e-07	8.3e-08	4.5e-07	1.8e-06	2.8e-06	1.7e-07	1.6e-08	8.8e-08	3.5e-07	5.4e-07
Zr-95	5.0e+00	5.0e-01	2.6e+00	1.1e+01	1.6e+01	9.9e-01	1.0e-01	5.2e-01	2.1e+00	3.2e+00
Nb-93m	4.4e-05	5.7e-06	2.5e-05	8.7e-05	1.3e-04	8.7e-06	1.1e-06	5.0e-06	1.7e-05	2.7e-05
Nb-94	1.6e+01	2.1e+00	9.2e+00	3.2e+01	4.8e+01	3.2e+00	4.1e-01	1.8e+00	6.3e+00	9.7e+00
Nb-95	1.3e+00	3.2e-02	3.9e-01	3.1e+00	5.2e+00	2.5e-01	6.3e-03	7.7e-02	6.1e-01	1.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.8e-01	8.5e-03	7.3e-02	4.2e-01	6.8e-01	3.6e-02	1.7e-03	1.5e-02	8.4e-02	1.4e-01
Sb-125	1.1e-01	9.0e-03	5.7e-02	2.4e-01	3.6e-01	2.2e-02	1.8e-03	1.1e-02	4.7e-02	7.1e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.9e-04	2.3e-05	2.0e-04	1.1e-03	1.8e-03	9.6e-05	4.7e-06	3.9e-05	2.2e-04	3.5e-04
I-129	1.3e-03	1.1e-04	8.7e-04	2.7e-03	4.2e-03	2.6e-04	2.3e-05	1.3e-04	5.5e-04	8.3e-04
I-131	1.3e-02	1.4e-09	8.9e-06	1.9e-02	5.8e-02	2.5e-03	2.7e-10	1.7e-06	3.9e-03	1.1e-02
Cs-134	3.5e-01	3.2e-02	1.8e-01	7.2e-01	1.1e+00	6.8e-02	6.3e-03	3.5e-02	1.4e-01	2.2e-01
Cs-135	4.6e-06	4.1e-07	2.3e-06	9.5e-06	1.5e-05	9.0e-07	8.3e-08	4.6e-07	1.9e-06	2.9e-06
Cs-137	1.4e-01	1.3e-02	7.1e-02	2.9e-01	4.4e-01	2.7e-02	2.5e-03	1.4e-02	5.7e-02	8.7e-02
Ba-133	2.9e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Ce-139	4.1e-01	4.9e-02	2.3e-01	8.5e-01	1.3e+00	8.1e-02	9.8e-03	4.5e-02	1.7e-01	2.5e-01
Ce-141	5.2e-02	1.1e-03	1.4e-02	1.3e-01	2.2e-01	1.0e-02	2.1e-04	2.9e-03	2.5e-02	4.2e-02
Ce-144	3.5e-01	4.5e-02	2.0e-01	7.0e-01	1.1e+00	6.9e-02	8.9e-03	4.0e-02	1.4e-01	2.1e-01
Pm-147	6.8e-05	8.7e-06	3.9e-05	1.4e-04	2.0e-04	1.3e-05	1.7e-06	7.7e-06	2.7e-05	4.1e-05

Table F1.23 Normalized effective dose equivalents from external exposure: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-06	1.3e-07	5.8e-07	2.0e-06	3.0e-06	2.0e-07	2.6e-08	1.1e-07	4.0e-07	6.1e-07
Eu-152	1.2e+01	1.5e+00	6.7e+00	2.3e+01	3.5e+01	2.3e+00	3.0e-01	1.3e+00	4.5e+00	7.1e+00
Eu-154	1.1e+01	1.5e+00	6.5e+00	2.2e+01	3.4e+01	2.2e+00	2.9e-01	1.3e+00	4.5e+00	6.9e+00
Eu-155	1.4e-01	1.8e-02	7.8e-02	2.7e-01	4.1e-01	2.7e-02	3.5e-03	1.5e-02	5.3e-02	8.3e-02
Gd-153	1.3e-01	1.6e-02	7.4e-02	2.6e-01	3.9e-01	2.6e-02	3.3e-03	1.5e-02	5.1e-02	7.8e-02
Tb-160	4.1e+00	3.5e-01	2.0e+00	8.9e+00	1.4e+01	8.1e-01	6.9e-02	4.0e-01	1.7e+00	2.7e+00
Tm-170	6.3e-03	7.3e-04	3.4e-03	1.3e-02	2.0e-02	1.2e-03	1.5e-04	6.8e-04	2.6e-03	3.9e-03
Tm-171	5.0e-04	6.4e-05	2.8e-04	9.8e-04	1.5e-03	9.8e-05	1.3e-05	5.6e-05	1.9e-04	3.0e-04
Ta-182	6.6e+00	7.4e-01	3.6e+00	1.4e+01	2.1e+01	1.3e+00	1.5e-01	7.1e-01	2.7e+00	4.1e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.9e+01	2.4e+00	1.1e+01	3.7e+01	5.5e+01	3.7e+00	4.7e-01	2.1e+00	7.2e+00	1.1e+01
Ra-228	1.0e+01	1.3e+00	5.9e+00	2.1e+01	3.2e+01	2.1e+00	2.6e-01	1.2e+00	4.1e+00	6.3e+00
Ac-227	3.1e+00	4.0e-01	1.7e+00	6.1e+00	9.1e+00	6.0e-01	7.8e-02	3.4e-01	1.2e+00	1.8e+00
Th-228	1.4e+01	1.8e+00	8.1e+00	2.8e+01	4.2e+01	2.8e+00	3.6e-01	1.6e+00	5.5e+00	8.6e+00
Th-229	2.2e+00	2.8e-01	1.3e+00	4.4e+00	6.6e+00	4.4e-01	5.6e-02	2.5e-01	8.6e-01	1.3e+00
Th-230	3.9e-03	3.8e-04	2.0e-03	8.1e-03	1.2e-02	7.7e-04	7.6e-05	4.0e-04	1.6e-03	2.5e-03
Th-232	4.2e-01	2.5e-02	2.0e-01	9.0e-01	1.4e+00	8.3e-02	4.9e-03	4.0e-02	1.8e-01	2.8e-01
Pa-231	2.9e-01	3.7e-02	1.6e-01	5.7e-01	8.7e-01	5.6e-02	7.2e-03	3.2e-02	1.1e-01	1.7e-01
U-232	1.9e+00	1.2e-01	9.3e-01	4.0e+00	6.2e+00	3.7e-01	2.5e-02	1.8e-01	7.8e-01	1.2e+00
U-233	1.3e-03	1.6e-04	7.2e-04	2.5e-03	3.8e-03	2.5e-04	3.2e-05	1.4e-04	4.9e-04	7.6e-04
U-234	3.1e-04	3.9e-05	1.7e-04	6.0e-04	9.1e-04	6.0e-05	7.8e-06	3.4e-05	1.2e-04	1.8e-04
U-235	9.8e-01	1.3e-01	5.6e-01	1.9e+00	2.9e+00	1.9e-01	2.5e-02	1.1e-01	3.8e-01	5.9e-01
U-236	1.4e-04	1.8e-05	8.1e-05	2.8e-04	4.2e-04	2.8e-05	3.6e-06	1.6e-05	5.6e-05	8.6e-05
U-238	2.5e-01	3.2e-02	1.4e-01	4.9e-01	7.4e-01	4.9e-02	6.3e-03	2.8e-02	9.7e-02	1.5e-01
Np-237	1.6e+00	2.1e-01	9.3e-01	3.2e+00	4.8e+00	3.2e-01	4.2e-02	1.8e-01	6.3e-01	9.8e-01
Pu-236	4.3e-03	1.0e-04	1.6e-03	9.4e-03	1.5e-02	8.4e-04	2.1e-05	3.3e-04	1.8e-03	3.0e-03
Pu-238	8.1e-05	1.0e-05	4.6e-05	1.6e-04	2.4e-04	1.6e-05	2.1e-06	9.1e-06	3.1e-05	4.9e-05
Pu-239	3.5e-04	4.5e-05	2.0e-04	6.9e-04	1.0e-03	6.9e-05	9.0e-06	3.9e-05	1.4e-04	2.1e-04
Pu-240	7.7e-05	9.9e-06	4.4e-05	1.5e-04	2.3e-04	1.5e-05	2.0e-06	8.7e-06	3.0e-05	4.7e-05
Pu-241	1.8e-05	1.8e-06	9.6e-06	3.8e-05	5.9e-05	3.8e-06	3.6e-07	1.9e-06	7.5e-06	1.2e-05
Pu-242	7.0e-05	9.0e-06	4.0e-05	1.4e-04	2.1e-04	1.4e-05	1.8e-06	7.8e-06	2.7e-05	4.2e-05
Pu-244	3.3e+00	4.2e-01	1.8e+00	6.4e+00	9.7e+00	6.4e-01	8.3e-02	3.7e-01	1.3e+00	2.0e+00
Am-241	2.4e-02	3.1e-03	1.4e-02	4.7e-02	7.1e-02	4.7e-03	6.1e-04	2.7e-03	9.3e-03	1.4e-02
Am-242m	7.7e-02	9.8e-03	4.3e-02	1.5e-01	2.3e-01	1.5e-02	2.0e-03	8.6e-03	3.0e-02	4.6e-02
Am-243	1.1e+00	1.4e-01	6.0e-01	2.1e+00	3.1e+00	2.1e-01	2.7e-02	1.2e-01	4.1e-01	6.5e-01
Cm-242	5.5e-05	6.7e-06	3.1e-05	1.1e-04	1.7e-04	1.1e-05	1.4e-06	6.1e-06	2.2e-05	3.4e-05
Cm-243	7.2e-01	9.2e-02	4.1e-01	1.4e+00	2.1e+00	1.4e-01	1.8e-02	8.0e-02	2.8e-01	4.3e-01
Cm-244	7.6e-05	9.8e-06	4.3e-05	1.5e-04	2.3e-04	1.5e-05	2.0e-06	8.6e-06	3.0e-05	4.6e-05
Cm-245	3.7e-01	4.8e-02	2.1e-01	7.3e-01	1.1e+00	7.3e-02	9.4e-03	4.2e-02	1.4e-01	2.2e-01
Cm-246	3.9e-05	5.0e-06	2.2e-05	7.8e-05	1.2e-04	7.7e-06	1.0e-06	4.4e-06	1.5e-05	2.4e-05
Cm-247	2.8e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Cm-248	3.6e-05	4.6e-06	2.0e-05	7.1e-05	1.1e-04	7.1e-06	9.2e-07	4.1e-06	1.4e-05	2.2e-05
Bk-249	1.7e-03	1.2e-04	6.3e-04	3.5e-03	5.4e-03	3.3e-04	2.3e-05	1.6e-04	6.9e-04	1.1e-03
Cf-248	8.8e-05	1.1e-05	5.0e-05	1.8e-04	2.7e-04	1.7e-05	2.2e-06	9.9e-06	3.5e-05	5.2e-05
Cf-249	2.8e+00	3.6e-01	1.6e+00	5.8e+00	8.3e+00	5.5e-01	7.2e-02	3.2e-01	1.1e+00	1.7e+00
Cf-250	4.4e-05	5.7e-06	2.5e-05	8.7e-05	1.3e-04	8.6e-06	1.1e-06	4.9e-06	1.7e-05	2.7e-05
Cf-251	5.7e-01	7.4e-02	3.2e-01	1.1e+00	1.7e+00	1.1e-01	1.5e-02	6.4e-02	2.2e-01	3.4e-01
Cf-252	9.4e-05	1.2e-05	5.3e-05	1.9e-04	2.8e-04	1.8e-05	2.4e-06	1.1e-05	3.6e-05	5.7e-05
Cf-254	5.6e+01	3.9e+00	2.6e+01	1.2e+02	2.0e+02	1.1e+01	7.8e-01	5.0e+00	2.4e+01	3.9e+01
Es-254	7.1e+00	8.9e-01	4.0e+00	1.4e+01	2.1e+01	1.4e+00	1.8e-01	7.9e-01	2.8e+00	4.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.24 Normalized effective dose equivalents from inhalation: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.8e-04	4.6e-05	2.1e-04	7.6e-04	1.2e-03	7.5e-05	9.2e-06	4.1e-05	1.5e-04	2.3e-04
P-32	2.1e-05	3.9e-09	8.6e-07	5.1e-05	1.0e-04	4.2e-06	7.9e-10	1.3e-07	1.0e-05	2.1e-05
S-35	9.4e-05	8.5e-06	4.8e-05	2.0e-04	3.0e-04	1.8e-05	1.7e-06	9.6e-06	3.9e-05	5.9e-05
Cl-36	5.8e-04	4.7e-05	2.8e-04	1.2e-03	1.9e-03	1.1e-04	9.1e-06	5.5e-05	2.4e-04	3.6e-04
K-40	6.8e-04	8.2e-05	3.7e-04	1.4e-03	2.1e-03	1.3e-04	1.6e-05	7.3e-05	2.7e-04	4.1e-04
Ca-41	1.4e-04	1.7e-05	7.7e-05	2.8e-04	4.3e-04	2.8e-05	3.4e-06	1.5e-05	5.5e-05	8.5e-05
Ca-45	4.1e-04	4.7e-05	2.3e-04	8.4e-04	1.3e-03	8.1e-05	9.3e-06	4.5e-05	1.7e-04	2.5e-04
Sc-46	1.2e-03	1.1e-04	6.2e-04	2.6e-03	4.0e-03	2.4e-04	2.2e-05	1.2e-04	5.1e-04	7.6e-04
Cr-51	1.4e-06	1.1e-08	2.6e-07	3.5e-06	6.1e-06	2.8e-07	2.2e-09	5.2e-08	6.8e-07	1.2e-06
Mn-53	4.7e-05	5.6e-06	2.6e-05	9.5e-05	1.4e-04	9.3e-06	1.1e-06	5.1e-06	1.9e-05	2.9e-05
Mn-54	4.8e-04	5.6e-05	2.7e-04	9.7e-04	1.5e-03	9.5e-05	1.1e-05	5.2e-05	1.9e-04	2.9e-04
Fe-55	3.4e-06	3.1e-07	1.8e-06	7.0e-06	1.1e-05	6.8e-07	6.1e-08	3.6e-07	1.4e-06	2.1e-06
Fe-59	7.3e-06	2.4e-07	2.6e-06	1.7e-05	2.8e-05	1.4e-06	4.7e-08	5.1e-07	3.3e-06	5.5e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.3e-05	4.5e-06	3.0e-05	1.4e-04	2.1e-04	1.2e-05	9.3e-07	5.9e-06	2.7e-05	4.2e-05
Sr-89	1.7e-04	8.7e-06	6.9e-05	3.8e-04	6.0e-04	3.3e-05	1.7e-06	1.4e-05	7.4e-05	1.2e-04
Sr-90	2.6e-02	3.1e-03	1.4e-02	5.1e-02	7.7e-02	5.0e-03	6.2e-04	2.8e-03	1.0e-02	1.5e-02
Y-91	1.5e-03	9.4e-05	6.5e-04	3.2e-03	5.0e-03	2.9e-04	1.9e-05	1.3e-04	6.4e-04	9.9e-04
Zr-93	8.7e-03	1.1e-03	4.8e-03	1.7e-02	2.6e-02	1.7e-03	2.1e-04	9.4e-04	3.4e-03	5.2e-03
Zr-95	7.2e-04	6.0e-05	3.6e-04	1.5e-03	2.4e-03	1.4e-04	1.2e-05	7.2e-05	3.0e-04	4.7e-04
Nb-93m	3.0e-03	3.7e-04	1.6e-03	6.0e-03	9.1e-03	5.9e-04	7.2e-05	3.2e-04	1.2e-03	1.8e-03
Nb-94	4.3e-02	5.3e-03	2.4e-02	8.7e-02	1.3e-01	8.5e-03	1.0e-03	4.7e-03	1.7e-02	2.6e-02
Nb-95	9.7e-05	2.3e-06	2.9e-05	2.4e-04	3.9e-04	1.9e-05	4.5e-07	5.7e-06	4.7e-05	7.8e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.4e-05	1.1e-06	9.4e-06	5.5e-05	8.8e-05	4.7e-06	2.1e-07	1.9e-06	1.1e-05	1.7e-05
Sb-125	4.1e-05	3.1e-06	2.0e-05	8.6e-05	1.3e-04	8.0e-06	6.2e-07	4.0e-06	1.7e-05	2.6e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.8e-04	8.3e-06	7.4e-05	4.1e-04	6.9e-04	3.6e-05	1.7e-06	1.5e-05	8.0e-05	1.3e-04
I-129	4.5e-03	3.5e-04	2.2e-03	9.5e-03	1.4e-02	8.8e-04	7.0e-05	4.4e-04	1.9e-03	2.8e-03
I-131	1.3e-05	1.4e-12	8.8e-09	1.9e-05	5.8e-05	2.5e-06	2.7e-13	1.7e-09	3.7e-06	1.2e-05
Cs-134	1.1e-04	9.3e-06	5.4e-05	2.2e-04	3.5e-04	2.1e-05	1.8e-06	1.1e-05	4.3e-05	6.9e-05
Cs-135	1.2e-05	1.0e-06	5.9e-06	2.4e-05	3.8e-05	2.3e-06	2.0e-07	1.2e-06	4.7e-06	7.6e-06
Cs-137	8.2e-05	7.1e-06	4.1e-05	1.7e-04	2.6e-04	1.6e-05	1.4e-06	8.1e-06	3.3e-05	5.3e-05
Ba-133	8.0e-04	9.8e-05	4.4e-04	1.6e-03	2.4e-03	1.6e-04	1.9e-05	8.7e-05	3.1e-04	4.8e-04
Ce-139	5.2e-04	5.8e-05	2.8e-04	1.1e-03	1.6e-03	1.0e-04	1.1e-05	5.6e-05	2.1e-04	3.1e-04
Ce-141	1.4e-04	2.6e-06	3.7e-05	3.3e-04	5.6e-04	2.7e-05	5.2e-07	7.3e-06	6.7e-05	1.1e-04
Ce-144	2.9e-02	3.4e-03	1.6e-02	5.8e-02	8.8e-02	5.7e-03	6.8e-04	3.2e-03	1.1e-02	1.7e-02
Pm-147	3.7e-03	4.6e-04	2.1e-03	7.4e-03	1.1e-02	7.3e-04	8.9e-05	4.1e-04	1.5e-03	2.2e-03

Table F1.24 Normalized effective dose equivalents from inhalation: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.1e-03	3.8e-04	1.7e-03	6.3e-03	9.5e-03	6.1e-04	7.5e-05	3.4e-04	1.2e-03	1.9e-03
Eu-152	2.3e-02	2.8e-03	1.2e-02	4.5e-02	6.9e-02	4.4e-03	5.4e-04	2.5e-03	8.9e-03	1.4e-02
Eu-154	2.9e-02	3.6e-03	1.6e-02	5.8e-02	8.8e-02	5.7e-03	6.9e-04	3.2e-03	1.1e-02	1.8e-02
Eu-155	4.1e-03	5.1e-04	2.3e-03	8.2e-03	1.2e-02	8.1e-04	9.8e-05	4.5e-04	1.6e-03	2.5e-03
Gd-153	6.9e-04	8.2e-05	3.8e-04	1.4e-03	2.1e-03	1.4e-04	1.6e-05	7.6e-05	2.7e-04	4.1e-04
Tb-160	9.1e-04	7.3e-05	4.4e-04	1.9e-03	3.0e-03	1.8e-04	1.5e-05	8.7e-05	3.9e-04	5.9e-04
Tm-170	1.5e-03	1.6e-04	7.8e-04	3.0e-03	4.5e-03	2.9e-04	3.1e-05	1.5e-04	5.8e-04	8.8e-04
Tm-171	8.4e-04	1.0e-04	4.7e-04	1.7e-03	2.6e-03	1.7e-04	2.0e-05	9.2e-05	3.3e-04	5.1e-04
Ta-182	2.3e-03	2.4e-04	1.2e-03	4.7e-03	7.2e-03	4.5e-04	4.8e-05	2.4e-04	9.3e-04	1.4e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	9.2e-01	1.1e-01	5.0e-01	1.8e+00	2.8e+00	1.8e-01	2.2e-02	9.9e-02	3.6e-01	5.5e-01
Ra-228	4.6e+00	3.7e-01	2.2e+00	9.7e+00	1.5e+01	9.1e-01	7.3e-02	4.4e-01	1.9e+00	3.0e+00
Ac-227	1.4e+02	1.7e+01	7.4e+01	2.7e+02	4.1e+02	2.7e+01	3.3e+00	1.5e+01	5.4e+01	8.2e+01
Th-228	3.2e+01	3.9e+00	1.8e+01	6.3e+01	9.6e+01	6.2e+00	7.6e-01	3.5e+00	1.3e+01	1.9e+01
Th-229	1.8e+02	2.2e+01	1.0e+02	3.6e+02	5.5e+02	3.6e+01	4.4e+00	2.0e+01	7.2e+01	1.1e+02
Th-230	2.7e+01	3.3e+00	1.5e+01	5.5e+01	8.3e+01	5.4e+00	6.6e-01	2.9e+00	1.1e+01	1.6e+01
Th-232	1.2e+02	1.5e+01	6.6e+01	2.4e+02	3.7e+02	2.4e+01	2.9e+00	1.3e+01	4.7e+01	7.2e+01
Pa-231	9.1e+01	1.1e+01	5.0e+01	1.8e+02	2.8e+02	1.8e+01	2.2e+00	9.9e+00	3.6e+01	5.5e+01
U-232	7.3e+01	8.8e+00	4.0e+01	1.5e+02	2.2e+02	1.4e+01	1.7e+00	7.8e+00	2.8e+01	4.4e+01
U-233	1.4e+01	1.7e+00	7.7e+00	2.8e+01	4.3e+01	2.8e+00	3.4e-01	1.5e+00	5.5e+00	8.6e+00
U-234	1.4e+01	1.7e+00	7.6e+00	2.8e+01	4.2e+01	2.7e+00	3.3e-01	1.5e+00	5.4e+00	8.4e+00
U-235	1.3e+01	1.6e+00	7.0e+00	2.6e+01	3.9e+01	2.5e+00	3.1e-01	1.4e+00	5.0e+00	7.8e+00
U-236	1.3e+01	1.6e+00	7.2e+00	2.6e+01	4.0e+01	2.6e+00	3.1e-01	1.4e+00	5.1e+00	7.9e+00
U-238	1.2e+01	1.5e+00	6.8e+00	2.5e+01	3.7e+01	2.4e+00	2.9e-01	1.3e+00	4.9e+00	7.5e+00
Np-237	5.6e+01	6.9e+00	3.1e+01	1.1e+02	1.7e+02	1.1e+01	1.4e+00	6.1e+00	2.2e+01	3.4e+01
Pu-236	1.3e+01	1.6e+00	7.0e+00	2.5e+01	3.8e+01	2.5e+00	3.0e-01	1.4e+00	5.0e+00	7.6e+00
Pu-238	3.0e+01	3.7e+00	1.6e+01	6.0e+01	9.1e+01	5.9e+00	7.2e-01	3.3e+00	1.2e+01	1.8e+01
Pu-239	3.2e+01	3.9e+00	1.8e+01	6.4e+01	9.7e+01	6.3e+00	7.7e-01	3.5e+00	1.3e+01	1.9e+01
Pu-240	3.2e+01	3.9e+00	1.8e+01	6.4e+01	9.7e+01	6.3e+00	7.7e-01	3.5e+00	1.3e+01	1.9e+01
Pu-241	5.3e-01	6.5e-02	2.9e-01	1.1e+00	1.6e+00	1.1e-01	1.3e-02	5.8e-02	2.1e-01	3.2e-01
Pu-242	3.1e+01	3.7e+00	1.7e+01	6.1e+01	9.3e+01	6.0e+00	7.3e-01	3.3e+00	1.2e+01	1.8e+01
Pu-244	3.0e+01	3.7e+00	1.7e+01	6.0e+01	9.1e+01	5.9e+00	7.3e-01	3.3e+00	1.2e+01	1.8e+01
Am-241	4.6e+01	5.6e+00	2.5e+01	9.3e+01	1.4e+02	9.1e+00	1.1e+00	5.0e+00	1.8e+01	2.8e+01
Am-242m	4.6e+01	5.6e+00	2.5e+01	9.2e+01	1.4e+02	9.0e+00	1.1e+00	5.0e+00	1.8e+01	2.8e+01
Am-243	4.6e+01	5.6e+00	2.5e+01	9.2e+01	1.4e+02	9.0e+00	1.1e+00	5.0e+00	1.8e+01	2.8e+01
Cm-242	1.1e+00	1.3e-01	6.3e-01	2.3e+00	3.5e+00	2.2e-01	2.6e-02	1.2e-01	4.5e-01	6.9e-01
Cm-243	3.2e+01	3.9e+00	1.7e+01	6.3e+01	9.7e+01	6.2e+00	7.6e-01	3.4e+00	1.3e+01	1.9e+01
Cm-244	2.6e+01	3.1e+00	1.4e+01	5.1e+01	7.7e+01	5.0e+00	6.1e-01	2.8e+00	1.0e+01	1.5e+01
Cm-245	4.7e+01	5.8e+00	2.6e+01	9.5e+01	1.4e+02	9.3e+00	1.1e+00	5.1e+00	1.9e+01	2.9e+01
Cm-246	4.7e+01	5.8e+00	2.6e+01	9.5e+01	1.4e+02	9.3e+00	1.1e+00	5.1e+00	1.9e+01	2.8e+01
Cm-247	4.3e+01	5.3e+00	2.4e+01	8.7e+01	1.3e+02	8.5e+00	1.0e+00	4.7e+00	1.7e+01	2.6e+01
Cm-248	1.7e+02	2.1e+01	9.4e+01	3.5e+02	5.2e+02	3.4e+01	4.2e+00	1.9e+01	6.8e+01	1.0e+02
Bk-249	1.3e-01	1.6e-02	7.4e-02	2.7e-01	4.1e-01	2.6e-02	3.2e-03	1.5e-02	5.3e-02	8.1e-02
Cf-248	4.4e+00	5.3e-01	2.4e+00	8.8e+00	1.3e+01	8.6e-01	1.0e-01	4.8e-01	1.7e+00	2.7e+00
Cf-249	4.0e+01	4.8e+00	2.2e+01	8.0e+01	1.2e+02	7.8e+00	9.6e-01	4.3e+00	1.6e+01	2.4e+01
Cf-250	2.1e+01	2.6e+00	1.2e+01	4.2e+01	6.4e+01	4.2e+00	5.1e-01	2.3e+00	8.4e+00	1.3e+01
Cf-251	4.1e+01	4.9e+00	2.2e+01	8.1e+01	1.2e+02	8.0e+00	9.7e-01	4.4e+00	1.6e+01	2.5e+01
Cf-252	1.5e+01	1.8e+00	8.2e+00	3.0e+01	4.5e+01	2.9e+00	3.6e-01	1.6e+00	5.9e+00	9.0e+00
Cf-254	9.1e+00	6.1e-01	4.1e+00	2.0e+01	3.1e+01	1.8e+00	1.2e-01	8.2e-01	3.9e+00	6.1e+00
Es-254	3.5e+00	4.2e-01	1.9e+00	6.9e+00	1.1e+01	6.8e-01	8.3e-02	3.8e-01	1.4e+00	2.1e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.25 Normalized effective dose equivalents from ingestion: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.9e-03	7.7e-05	9.3e-04	4.0e-03	6.4e-03	3.8e-04	1.5e-05	1.8e-04	7.9e-04	1.2e-03
P-32	1.1e-04	1.1e-08	2.3e-06	2.2e-04	4.9e-04	2.1e-05	2.3e-09	4.6e-07	4.4e-05	9.8e-05
S-35	5.8e-05	1.8e-06	2.5e-05	1.3e-04	2.0e-04	1.1e-05	3.7e-07	4.9e-06	2.5e-05	4.1e-05
Cl-36	2.7e-04	7.9e-06	1.1e-04	5.7e-04	9.1e-04	5.2e-05	1.6e-06	2.2e-05	1.1e-04	1.8e-04
K-40	3.4e-03	1.4e-04	1.7e-03	7.2e-03	1.1e-02	6.7e-04	2.7e-05	3.3e-04	1.4e-03	2.2e-03
Ca-41	4.5e-04	1.9e-05	2.2e-04	9.3e-04	1.5e-03	8.8e-05	3.6e-06	4.3e-05	1.8e-04	2.8e-04
Ca-45	6.7e-04	2.6e-05	3.2e-04	1.4e-03	2.3e-03	1.3e-04	5.1e-06	6.3e-05	2.8e-04	4.5e-04
Sc-46	8.9e-04	2.8e-05	3.8e-04	1.9e-03	3.1e-03	1.8e-04	5.6e-06	7.6e-05	3.8e-04	6.3e-04
Cr-51	2.2e-06	7.8e-09	3.1e-07	4.9e-06	9.1e-06	4.3e-07	1.6e-09	6.1e-08	9.6e-07	1.8e-06
Mn-53	3.4e-05	1.4e-06	1.7e-05	7.2e-05	1.1e-04	6.8e-06	2.7e-07	3.3e-06	1.4e-05	2.2e-05
Mn-54	6.7e-04	2.6e-05	3.2e-04	1.4e-03	2.2e-03	1.3e-04	5.2e-06	6.4e-05	2.8e-04	4.4e-04
Fe-55	5.2e-06	1.7e-07	2.4e-06	1.1e-05	1.8e-05	1.0e-06	3.3e-08	4.7e-07	2.2e-06	3.5e-06
Fe-59	1.4e-05	1.9e-07	3.9e-06	3.2e-05	5.5e-05	2.7e-06	3.9e-08	7.8e-07	6.3e-06	1.0e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.2e-04	5.9e-06	8.6e-05	4.9e-04	7.9e-04	4.3e-05	1.2e-06	1.7e-05	9.7e-05	1.6e-04
Sr-89	8.1e-04	1.6e-05	2.7e-04	1.9e-03	3.0e-03	1.6e-04	3.4e-06	5.4e-05	3.7e-04	6.0e-04
Sr-90	5.3e-02	2.2e-03	2.6e-02	1.1e-01	1.8e-01	1.0e-02	4.3e-04	5.1e-03	2.2e-02	3.4e-02
Y-91	9.6e-04	2.4e-05	3.6e-04	2.2e-03	3.5e-03	1.9e-04	4.7e-06	7.1e-05	4.3e-04	6.9e-04
Zr-93	5.8e-04	2.4e-05	2.8e-04	1.2e-03	1.9e-03	1.1e-04	4.7e-06	5.6e-05	2.4e-04	3.7e-04
Zr-95	7.2e-04	1.3e-05	3.1e-04	1.6e-03	2.5e-03	1.4e-04	4.5e-06	6.2e-05	3.1e-04	5.0e-04
Nb-93m	1.8e-04	7.5e-06	8.8e-05	3.8e-04	6.0e-04	3.5e-05	1.5e-06	1.7e-05	7.4e-05	1.1e-04
Nb-94	2.5e-03	1.0e-04	1.2e-03	5.2e-03	8.3e-03	4.9e-04	2.0e-05	2.4e-04	1.0e-03	1.6e-03
Nb-95	1.5e-04	1.5e-06	3.5e-05	3.5e-04	6.0e-04	2.9e-05	3.1e-07	6.9e-06	6.8e-05	1.2e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.2e-05	5.7e-07	1.1e-05	7.5e-05	1.2e-04	6.4e-06	1.2e-07	2.1e-06	1.5e-05	2.4e-05
Sb-125	3.6e-05	1.0e-06	1.5e-05	7.8e-05	1.3e-04	7.1e-06	2.0e-07	3.0e-06	1.5e-05	2.5e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.0e-03	1.8e-05	3.3e-04	2.2e-03	3.8e-03	2.0e-04	3.6e-06	6.5e-05	4.4e-04	7.5e-04
I-129	2.4e-02	7.0e-04	1.0e-02	5.3e-02	8.3e-02	4.7e-03	1.4e-04	2.0e-03	1.0e-02	1.6e-02
I-131	7.3e-05	5.1e-12	3.6e-08	8.4e-05	3.1e-04	1.5e-05	9.8e-13	7.4e-09	1.6e-05	5.9e-05
Cs-134	5.7e-04	1.8e-05	2.5e-04	1.2e-03	1.9e-03	1.1e-04	3.6e-06	4.9e-05	2.3e-04	3.8e-04
Cs-135	8.2e-05	2.0e-06	2.7e-05	1.3e-04	2.1e-04	1.2e-05	3.9e-07	5.3e-06	2.5e-05	4.1e-05
Cs-137	4.3e-04	1.4e-05	1.9e-04	9.0e-04	1.5e-03	8.5e-05	2.7e-06	3.7e-05	1.8e-04	2.9e-04
Ba-133	1.2e-03	4.8e-05	5.7e-04	2.4e-03	3.8e-03	2.3e-04	9.4e-06	1.1e-04	4.8e-04	7.4e-04
Ce-139	2.2e-04	8.2e-06	1.0e-04	4.8e-04	7.6e-04	4.4e-05	1.6e-06	2.1e-05	9.3e-05	1.5e-04
Ce-141	1.5e-04	1.3e-06	3.3e-05	3.6e-04	6.3e-04	3.0e-05	2.6e-07	6.4e-06	7.1e-05	1.2e-04
Ce-144	5.5e-03	2.2e-04	2.7e-03	1.2e-02	1.8e-02	1.1e-03	4.3e-05	5.3e-04	2.3e-03	3.6e-03
Pm-147	3.3e-04	1.4e-05	1.6e-04	7.0e-04	1.1e-03	6.6e-05	2.7e-06	3.2e-05	1.4e-04	2.1e-04

Table F1.25 Normalized effective dose equivalents from ingestion: Processing steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.4e-04	5.6e-06	6.6e-05	2.8e-04	4.5e-04	2.7e-05	1.1e-06	1.3e-05	5.5e-05	8.7e-05
Eu-152	2.2e-03	9.2e-05	1.1e-03	4.7e-03	7.3e-03	4.4e-04	1.8e-05	2.1e-04	9.1e-04	1.4e-03
Eu-154	3.3e-03	1.3e-04	1.6e-03	6.8e-03	1.1e-02	6.4e-04	2.6e-05	3.1e-04	1.3e-03	2.1e-03
Eu-155	5.1e-04	2.1e-05	2.5e-04	1.1e-03	1.7e-03	1.0e-04	4.1e-06	4.9e-05	2.1e-04	3.3e-04
Gd-153	2.9e-04	1.1e-05	1.4e-04	6.1e-04	9.6e-04	5.7e-05	2.2e-06	2.8e-05	1.2e-04	1.9e-04
Tb-160	8.3e-04	2.4e-05	3.4e-04	1.8e-03	3.0e-03	1.6e-04	4.7e-06	6.8e-05	3.6e-04	5.9e-04
Tm-170	9.9e-04	3.6e-05	4.6e-04	2.1e-03	3.4e-03	1.9e-04	7.2e-06	9.1e-05	4.2e-04	6.6e-04
Tm-171	1.3e-04	5.4e-06	6.5e-05	2.8e-04	4.4e-04	2.6e-05	1.1e-06	1.3e-05	5.4e-05	8.6e-05
Ta-182	1.1e-03	4.0e-05	5.2e-04	2.4e-03	3.9e-03	2.2e-04	8.1e-06	1.0e-04	4.8e-04	7.7e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	4.9e-01	2.0e-02	2.4e-01	1.0e+00	1.6e+00	9.6e-02	3.9e-03	4.7e-02	2.0e-01	3.1e-01
Ra-228	5.2e-01	2.1e-02	2.5e-01	1.1e+00	1.7e+00	1.0e-01	4.1e-03	4.9e-02	2.1e-01	3.3e-01
Ac-227	5.1e+00	2.1e-01	2.5e+00	1.1e+01	1.7e+01	1.0e+00	4.1e-02	4.9e-01	2.1e+00	3.3e+00
Th-228	2.5e-01	1.0e-02	1.2e-01	5.2e-01	8.2e-01	4.9e-02	2.0e-03	2.4e-02	1.0e-01	1.6e-01
Th-229	1.4e+00	5.9e-02	6.8e-01	3.0e+00	4.7e+00	2.8e-01	1.1e-02	1.4e-01	5.7e-01	9.0e-01
Th-230	1.9e-01	8.0e-03	9.3e-02	4.0e-01	6.3e-01	3.8e-02	1.6e-03	1.8e-02	7.8e-02	1.2e-01
Th-232	9.8e-01	4.1e-02	4.7e-01	2.0e+00	3.2e+00	1.9e-01	8.0e-03	9.4e-02	4.0e-01	6.2e-01
Pa-231	3.8e+00	1.6e-01	1.8e+00	7.9e+00	1.2e+01	7.4e-01	3.0e-02	3.6e-01	1.5e+00	2.4e+00
U-232	5.7e-02	2.2e-03	2.6e-02	1.2e-01	1.8e-01	1.1e-02	4.3e-04	5.1e-03	2.3e-02	3.7e-02
U-233	9.3e-03	3.9e-04	4.5e-03	2.0e-02	3.1e-02	1.8e-03	7.5e-05	8.9e-04	3.8e-03	5.9e-03
U-234	9.2e-03	3.8e-04	4.5e-03	1.9e-02	3.0e-02	1.8e-03	7.4e-05	8.8e-04	3.8e-03	5.8e-03
U-235	9.8e-03	4.1e-04	4.8e-03	2.1e-02	3.2e-02	1.9e-03	8.0e-05	9.5e-04	4.0e-03	6.3e-03
U-236	8.7e-03	3.6e-04	4.2e-03	1.8e-02	2.9e-02	1.7e-03	7.0e-05	8.3e-04	3.6e-03	5.5e-03
U-238	1.3e-02	5.4e-04	6.4e-03	2.7e-02	4.3e-02	2.6e-03	1.1e-04	1.3e-03	5.4e-03	8.4e-03
Np-237	1.6e+00	6.4e-02	7.6e-01	3.3e+00	5.1e+00	3.1e-01	1.3e-02	1.5e-01	6.4e-01	9.9e-01
Pu-236	3.8e-01	1.5e-02	1.8e-01	7.9e-01	1.2e+00	7.4e-02	3.0e-03	3.6e-02	1.5e-01	2.4e-01
Pu-238	1.1e+00	4.6e-02	5.4e-01	2.3e+00	3.7e+00	2.2e-01	9.0e-03	1.1e-01	4.6e-01	7.1e-01
Pu-239	1.2e+00	5.1e-02	6.0e-01	2.6e+00	4.1e+00	2.4e-01	1.0e-02	1.2e-01	5.1e-01	7.9e-01
Pu-240	1.2e+00	5.1e-02	6.0e-01	2.6e+00	4.1e+00	2.4e-01	1.0e-02	1.2e-01	5.1e-01	7.9e-01
Pu-241	2.4e-02	1.0e-03	1.2e-02	5.1e-02	8.0e-02	4.8e-03	2.0e-04	2.3e-03	9.9e-03	1.5e-02
Pu-242	1.2e+00	4.9e-02	5.7e-01	2.5e+00	3.9e+00	2.3e-01	9.5e-03	1.1e-01	4.8e-01	7.5e-01
Pu-244	1.2e+00	4.8e-02	5.7e-01	2.4e+00	3.8e+00	2.3e-01	9.4e-03	1.1e-01	4.8e-01	7.4e-01
Am-241	1.3e+00	5.3e-02	6.2e-01	2.7e+00	4.2e+00	2.5e-01	1.0e-02	1.2e-01	5.2e-01	8.1e-01
Am-242m	1.3e+00	5.2e-02	6.1e-01	2.6e+00	4.2e+00	2.5e-01	1.0e-02	1.2e-01	5.2e-01	8.1e-01
Am-243	1.3e+00	5.3e-02	6.2e-01	2.6e+00	4.2e+00	2.5e-01	1.0e-02	1.2e-01	5.2e-01	8.1e-01
Cm-242	2.6e-02	1.0e-03	1.3e-02	5.6e-02	8.8e-02	5.2e-03	2.1e-04	2.5e-03	1.1e-02	1.7e-02
Cm-243	8.7e-01	3.6e-02	4.2e-01	1.8e+00	2.9e+00	1.7e-01	7.0e-03	8.4e-02	3.6e-01	5.6e-01
Cm-244	7.0e-01	2.9e-02	3.4e-01	1.5e+00	2.3e+00	1.4e-01	5.6e-03	6.7e-02	2.8e-01	4.5e-01
Cm-245	1.3e+00	5.4e-02	6.4e-01	2.7e+00	4.3e+00	2.6e-01	1.1e-02	1.3e-01	5.4e-01	8.4e-01
Cm-246	1.3e+00	5.4e-02	6.3e-01	2.7e+00	4.3e+00	2.5e-01	1.0e-02	1.2e-01	5.3e-01	8.3e-01
Cm-247	1.2e+00	5.0e-02	5.8e-01	2.5e+00	3.9e+00	2.4e-01	9.7e-03	1.2e-01	4.9e-01	7.6e-01
Cm-248	4.8e+00	2.0e-01	2.3e+00	1.0e+01	1.6e+01	9.4e-01	3.8e-02	4.6e-01	2.0e+00	3.0e+00
Bk-249	4.2e-03	1.7e-04	2.0e-03	8.7e-03	1.4e-02	8.2e-04	3.4e-05	4.0e-04	1.7e-03	2.7e-03
Cf-248	9.9e-02	3.9e-03	4.8e-02	2.1e-01	3.2e-01	1.9e-02	7.8e-04	9.5e-03	4.0e-02	6.4e-02
Cf-249	1.7e+00	6.8e-02	8.1e-01	3.5e+00	5.5e+00	3.3e-01	1.3e-02	1.6e-01	6.8e-01	1.1e+00
Cf-250	7.3e-01	3.0e-02	3.6e-01	1.5e+00	2.4e+00	1.4e-01	5.9e-03	7.1e-02	3.0e-01	4.7e-01
Cf-251	1.7e+00	7.0e-02	8.3e-01	3.5e+00	5.6e+00	3.3e-01	1.4e-02	1.6e-01	6.9e-01	1.1e+00
Cf-252	3.5e-01	1.4e-02	1.7e-01	7.3e-01	1.1e+00	6.8e-02	2.8e-03	3.3e-02	1.4e-01	2.2e-01
Cf-254	2.5e-01	6.4e-03	9.6e-02	5.7e-01	9.2e-01	5.0e-02	1.3e-03	1.9e-02	1.1e-01	1.8e-01
Es-254	9.2e-02	3.7e-03	4.5e-02	1.9e-01	3.0e-01	1.8e-02	7.3e-04	8.8e-03	3.8e-02	6.0e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.26 Normalized effective dose equivalents from all pathways: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.5e-04	6.0e-05	1.4e-04	2.4e-04	2.9e-04	2.9e-05	1.2e-05	2.7e-05	4.8e-05	5.6e-05
C-14	1.4e-04	2.6e-07	1.1e-04	3.0e-04	4.0e-04	2.8e-05	4.9e-08	2.2e-05	6.0e-05	7.8e-05
Na-22	4.4e-01	1.2e-03	4.7e-03	1.7e+00	2.8e+00	8.7e-02	2.5e-04	9.3e-04	3.3e-01	5.6e-01
P-32	5.6e-05	1.4e-07	9.2e-07	1.7e-04	3.4e-04	1.1e-05	2.7e-08	1.8e-07	3.4e-05	6.8e-05
S-35	6.1e-05	1.6e-07	8.9e-07	1.8e-04	3.3e-04	1.2e-05	3.2e-08	1.8e-07	3.6e-05	6.6e-05
Cl-36	1.4e+00	1.1e-01	6.5e-01	3.1e+00	4.9e+00	2.7e-01	2.2e-02	1.3e-01	6.2e-01	9.5e-01
K-40	5.6e-02	1.9e-04	5.8e-04	2.2e-01	3.6e-01	1.1e-02	3.9e-05	1.1e-04	4.4e-02	7.1e-02
Ca-41	7.0e-05	3.0e-07	1.0e-06	2.4e-04	4.1e-04	1.4e-05	6.0e-08	2.1e-07	4.8e-05	8.1e-05
Ca-45	1.1e-04	6.1e-07	1.7e-06	4.5e-04	7.3e-04	2.3e-05	1.2e-07	3.4e-07	8.8e-05	1.4e-04
Sc-46	5.1e-03	2.0e-05	8.3e-05	1.9e-02	3.3e-02	1.0e-03	4.0e-06	1.6e-05	3.7e-03	6.6e-03
Cr-51	3.1e-06	3.1e-08	1.5e-07	9.6e-06	1.9e-05	6.1e-07	6.2e-09	2.9e-08	1.9e-06	3.8e-06
Mn-53	1.0e-06	2.8e-08	7.0e-08	3.4e-06	6.8e-06	2.1e-07	5.7e-09	1.4e-08	6.8e-07	1.3e-06
Mn-54	1.1e-03	2.0e-05	8.1e-05	3.5e-03	7.1e-03	2.3e-04	4.1e-06	1.6e-05	6.9e-04	1.4e-03
Fe-55	4.8e-06	4.0e-08	1.3e-07	1.6e-05	3.2e-05	9.4e-07	8.0e-09	2.5e-08	3.3e-06	6.4e-06
Fe-59	2.1e-04	1.3e-06	5.7e-06	6.6e-04	1.4e-03	4.2e-05	2.7e-07	1.1e-06	1.3e-04	2.7e-04
Co-56	1.3e-03	7.8e-06	3.4e-05	4.0e-03	8.1e-03	2.5e-04	1.6e-06	6.7e-06	8.0e-04	1.6e-03
Co-57	1.5e-04	9.7e-07	4.0e-06	4.9e-04	9.7e-04	3.0e-05	1.9e-07	7.9e-07	9.6e-05	1.9e-04
Co-58	3.2e-04	2.0e-06	8.6e-06	1.0e-03	2.1e-03	6.4e-05	4.0e-07	1.7e-06	2.0e-04	4.0e-04
Co-60	5.6e-03	3.6e-05	1.5e-04	1.8e-02	3.7e-02	1.1e-03	7.1e-06	2.9e-05	3.6e-03	7.2e-03
Ni-59	2.6e-06	2.1e-08	6.6e-08	8.3e-06	1.7e-05	5.1e-07	4.1e-09	1.3e-08	1.7e-06	3.5e-06
Ni-63	8.8e-06	5.5e-08	1.7e-07	2.2e-05	4.6e-05	1.3e-06	1.1e-08	3.4e-08	4.4e-06	9.2e-06
Zn-65	1.1e-01	5.4e-04	1.7e-03	4.6e-01	7.3e-01	2.2e-02	1.1e-04	3.3e-04	9.1e-02	1.5e-01
As-73	3.7e-04	1.6e-06	5.2e-06	1.4e-03	2.3e-03	7.3e-05	3.2e-07	1.0e-06	2.9e-04	4.7e-04
Se-75	5.6e-03	2.2e-04	7.4e-04	1.9e-02	3.2e-02	1.1e-03	4.5e-05	1.5e-04	3.7e-03	6.2e-03
Sr-85	9.5e-04	3.7e-06	1.6e-05	3.6e-03	6.1e-03	1.9e-04	7.3e-07	3.1e-06	7.0e-04	1.2e-03
Sr-89	1.5e-04	8.1e-07	2.4e-06	6.0e-04	9.6e-04	3.0e-05	1.7e-07	4.7e-07	1.2e-04	1.9e-04
Sr-90	8.0e-03	4.3e-05	1.3e-04	3.1e-02	5.0e-02	1.6e-03	8.5e-06	2.5e-05	6.2e-03	1.0e-02
Y-91	3.1e-04	1.6e-06	4.9e-06	1.2e-03	2.0e-03	6.1e-05	3.2e-07	9.6e-07	2.5e-04	3.9e-04
Zr-93	5.6e-04	2.6e-06	8.9e-06	2.2e-03	3.5e-03	1.1e-04	5.2e-07	1.7e-06	4.4e-04	6.9e-04
Zr-95	1.4e-03	5.5e-06	2.3e-05	5.2e-03	8.9e-03	2.7e-04	1.1e-06	4.5e-06	1.0e-03	1.8e-03
Nb-93m	2.1e-04	1.0e-06	3.3e-06	8.4e-04	1.4e-03	4.2e-05	2.0e-07	6.5e-07	1.7e-04	2.7e-04
Nb-94	2.8e-02	1.2e-04	4.5e-04	1.1e-01	1.8e-01	5.5e-03	2.3e-05	8.9e-05	2.1e-02	3.6e-02
Nb-95	6.1e-04	2.2e-06	1.0e-05	2.2e-03	3.9e-03	1.2e-04	4.4e-07	2.0e-06	4.3e-04	7.7e-04
Mo-93	4.8e-05	3.9e-07	1.2e-06	1.7e-04	3.1e-04	9.4e-06	7.8e-08	2.4e-07	3.4e-05	6.2e-05
Tc-97	2.3e-05	1.6e-07	6.1e-07	7.9e-05	1.5e-04	4.6e-06	3.2e-08	1.2e-07	1.5e-05	3.1e-05
Tc-97m	1.4e-05	1.0e-07	3.6e-07	4.7e-05	9.1e-05	2.8e-06	2.1e-08	7.2e-08	9.4e-06	1.8e-05
Tc-99	5.8e-05	2.8e-07	1.4e-06	1.6e-04	3.5e-04	1.2e-05	5.7e-08	2.7e-07	3.2e-05	6.9e-05
Ru-103	7.3e-05	4.7e-07	2.0e-06	2.3e-04	4.7e-04	1.4e-05	9.2e-08	3.9e-07	4.6e-05	9.3e-05
Ru-106	8.1e-04	6.7e-06	2.1e-05	2.8e-03	5.3e-03	1.6e-04	1.3e-06	4.2e-06	5.5e-04	1.0e-03
Ag-108m	5.3e-03	2.3e-04	1.2e-03	1.3e-02	2.7e-02	1.0e-03	4.6e-05	2.5e-04	2.6e-03	5.4e-03
Ag-110m	3.9e-03	1.7e-04	9.2e-04	9.9e-03	2.0e-02	7.6e-04	3.4e-05	1.8e-04	1.9e-03	3.9e-03
Cd-109	2.2e-02	1.3e-04	3.3e-04	8.8e-02	1.4e-01	4.3e-03	2.5e-05	6.4e-05	1.7e-02	2.7e-02
Sn-113	3.5e-04	1.2e-06	4.7e-06	1.3e-03	2.2e-03	6.8e-05	2.4e-07	9.3e-07	2.6e-04	4.4e-04
Sb-124	5.9e-02	2.4e-05	1.2e-04	2.3e-01	3.9e-01	1.2e-02	4.8e-06	2.4e-05	4.6e-02	7.7e-02
Sb-125	1.1e-01	4.6e-05	2.4e-04	4.5e-01	7.5e-01	2.2e-02	9.0e-06	4.6e-05	8.8e-02	1.5e-01
Te-123m	8.7e-03	6.8e-05	2.2e-04	3.4e-02	5.8e-02	1.7e-03	1.4e-05	4.2e-05	6.8e-03	1.1e-02
Te-127m	4.1e-03	4.0e-05	9.5e-05	1.7e-02	2.6e-02	8.0e-04	8.0e-06	1.9e-05	3.3e-03	5.2e-03
I-125	7.3e-01	2.1e-01	6.3e-01	1.3e+00	1.6e+00	1.4e-01	4.3e-02	1.2e-01	2.6e-01	3.1e-01
I-129	9.9e+00	3.0e+00	8.5e+00	1.7e+01	2.1e+01	1.9e+00	5.9e-01	1.7e+00	3.4e+00	4.1e+00
I-131	4.9e-02	3.4e-03	2.7e-02	1.2e-01	1.7e-01	9.7e-03	6.8e-04	5.3e-03	2.5e-02	3.3e-02
Cs-134	3.7e-01	2.3e-03	7.4e-03	1.4e+00	2.4e+00	7.2e-02	4.7e-04	1.5e-03	2.8e-01	4.6e-01
Cs-135	8.0e-03	5.3e-05	1.6e-04	3.1e-02	5.1e-02	1.6e-03	1.1e-05	3.2e-05	6.2e-03	1.0e-02
Cs-137	1.9e-01	1.3e-03	3.9e-03	7.7e-01	1.3e+00	3.8e-02	2.6e-04	7.7e-04	1.5e-01	2.5e-01
Ba-133	8.2e-03	2.3e-05	1.0e-04	2.3e-02	4.1e-02	1.2e-03	4.8e-06	2.0e-05	4.6e-03	8.1e-03
Ce-139	7.3e-04	3.0e-06	1.2e-05	2.8e-03	4.7e-03	1.4e-04	6.1e-07	2.4e-06	5.5e-04	9.3e-04
Ce-141	9.5e-05	4.3e-07	1.5e-06	3.6e-04	6.0e-04	1.9e-05	8.6e-08	3.0e-07	7.1e-05	1.2e-04
Ce-144	2.9e-03	1.5e-05	4.6e-05	1.2e-02	1.9e-02	5.7e-04	3.0e-06	9.0e-06	2.3e-03	3.7e-03
Pm-147	2.6e-04	1.3e-06	4.1e-06	1.0e-03	1.7e-03	5.2e-05	2.5e-07	8.1e-07	2.0e-04	3.3e-04

Table F1.26 Normalized effective dose equivalents from all pathways: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-04	9.2e-07	3.2e-06	7.9e-04	1.3e-03	4.0e-05	1.8e-07	6.2e-07	1.6e-04	2.5e-04
Eu-152	1.9e-02	7.7e-05	3.0e-04	7.3e-02	1.2e-01	3.7e-03	1.5e-05	5.9e-05	1.5e-02	2.4e-02
Eu-154	2.0e-02	8.4e-05	3.3e-04	7.9e-02	1.3e-01	4.0e-03	1.7e-05	6.4e-05	1.6e-02	2.6e-02
Eu-155	1.2e-03	5.2e-06	1.8e-05	4.6e-03	7.4e-03	2.3e-04	1.1e-06	3.6e-06	9.2e-04	1.5e-03
Gd-153	8.2e-04	3.3e-06	1.3e-05	3.2e-03	5.3e-03	1.6e-04	6.7e-07	2.6e-06	6.2e-04	1.1e-03
Tb-160	2.4e-03	9.7e-06	4.0e-05	9.2e-03	1.5e-02	4.8e-04	2.0e-06	7.9e-06	1.8e-03	3.1e-03
Tm-170	2.3e-04	1.3e-06	3.6e-06	9.6e-04	1.5e-03	4.6e-05	2.6e-07	7.1e-07	1.9e-04	2.9e-04
Tm-171	7.2e-05	3.6e-07	1.1e-06	2.9e-04	4.5e-04	1.4e-05	7.2e-08	2.2e-07	5.7e-05	8.9e-05
Ta-182	4.7e-03	1.9e-05	7.7e-05	1.8e-02	3.0e-02	9.2e-04	3.7e-06	1.5e-05	3.5e-03	6.0e-03
W-181	2.6e-05	1.7e-07	6.9e-07	8.2e-05	1.7e-04	5.2e-06	3.3e-08	1.4e-07	1.6e-05	3.4e-05
W-185	1.1e-05	5.9e-08	2.7e-07	3.0e-05	6.4e-05	2.2e-06	1.2e-08	5.4e-08	6.0e-06	1.3e-05
Os-185	4.1e-02	1.7e-04	5.6e-04	1.6e-01	2.7e-01	8.1e-03	3.4e-05	1.3e-04	3.1e-02	5.3e-02
Ir-192	3.0e-04	1.9e-06	8.0e-06	9.9e-04	2.0e-03	5.9e-05	3.8e-07	1.6e-06	2.0e-04	3.9e-04
Tl-204	4.3e-03	2.1e-05	6.9e-05	1.6e-02	2.5e-02	8.5e-04	4.2e-06	1.4e-05	3.1e-03	5.0e-03
Pb-210	5.3e+00	3.5e-02	7.8e-02	2.3e+01	3.4e+01	1.0e+00	7.1e-03	1.5e-02	4.5e+00	6.8e+00
Bi-207	4.8e-01	2.0e-03	7.6e-03	1.8e+00	3.1e+00	9.4e-02	3.9e-04	1.5e-03	3.6e-01	6.1e-01
Po-210	1.5e+00	9.2e-03	2.2e-02	6.5e+00	1.0e+01	3.0e-01	1.9e-03	4.3e-03	1.3e+00	2.0e+00
Ra-226	1.1e-01	6.1e-04	1.7e-03	4.5e-01	7.0e-01	2.1e-02	1.2e-04	3.3e-04	8.9e-02	1.4e-01
Ra-228	7.2e-02	4.2e-04	1.1e-03	3.0e-01	4.6e-01	1.4e-02	8.5e-05	2.2e-04	5.9e-02	9.1e-02
Ac-227	8.7e+00	4.0e-02	1.4e-01	3.4e+01	5.5e+01	1.7e+00	8.1e-03	2.7e-02	6.8e+00	1.1e+01
Th-228	2.2e+00	9.6e-03	3.4e-02	8.4e+00	1.4e+01	4.3e-01	1.9e-03	6.6e-03	1.7e+00	2.7e+00
Th-229	1.1e+01	5.1e-02	1.6e-01	4.4e+01	7.2e+01	2.3e+00	1.0e-02	3.5e-02	8.8e+00	1.4e+01
Th-230	1.7e+00	7.6e-03	2.7e-02	6.7e+00	1.1e+01	3.4e-01	1.5e-03	5.3e-03	1.3e+00	2.1e+00
Th-232	7.5e+00	3.3e-02	1.2e-01	2.9e+01	4.8e+01	1.5e+00	6.7e-03	2.3e-02	5.8e+00	9.4e+00
Pa-231	5.7e+00	2.6e-02	9.0e-02	2.3e+01	3.7e+01	1.1e+00	5.2e-03	1.8e-02	4.5e+00	7.3e+00
U-232	4.3e+00	1.9e-02	6.8e-02	1.7e+01	2.7e+01	8.5e-01	3.9e-03	1.3e-02	3.4e+00	5.4e+00
U-233	6.9e-01	4.0e-03	1.4e-02	3.5e+00	5.6e+00	1.8e-01	8.0e-04	2.8e-03	7.0e-01	1.1e+00
U-234	6.7e-01	3.9e-03	1.4e-02	3.4e+00	5.5e+00	1.7e-01	7.8e-04	2.7e-03	6.8e-01	1.1e+00
U-235	8.1e-01	3.6e-03	1.3e-02	3.2e+00	5.1e+00	1.6e-01	7.3e-04	2.5e-03	6.3e-01	1.0e+00
U-236	8.2e-01	3.7e-03	1.3e-02	3.2e+00	5.2e+00	1.6e-01	7.4e-04	2.6e-03	6.4e-01	1.0e+00
U-238	7.8e-01	3.5e-03	1.2e-02	3.0e+00	4.9e+00	1.5e-01	7.0e-04	2.4e-03	6.1e-01	9.7e-01
Np-237	3.6e+00	1.6e-02	5.6e-02	1.4e+01	2.3e+01	7.1e-01	3.3e-03	1.1e-02	2.7e+00	4.5e+00
Pu-236	8.2e-01	3.7e-03	1.3e-02	3.2e+00	5.3e+00	1.6e-01	7.4e-04	2.5e-03	6.3e-01	1.0e+00
Pu-238	1.9e+00	8.7e-03	3.0e-02	7.5e+00	1.2e+01	3.8e-01	1.7e-03	5.9e-03	1.5e+00	2.4e+00
Pu-239	2.0e+00	9.3e-03	3.2e-02	8.1e+00	1.3e+01	4.0e-01	1.9e-03	6.3e-03	1.6e+00	2.6e+00
Pu-240	2.0e+00	9.3e-03	3.2e-02	8.1e+00	1.3e+01	4.0e-01	1.9e-03	6.3e-03	1.6e+00	2.6e+00
Pu-241	3.3e-02	1.5e-04	5.2e-04	1.3e-01	2.1e-01	6.5e-03	3.0e-05	1.0e-04	2.5e-02	4.2e-02
Pu-242	1.9e+00	8.8e-03	3.1e-02	7.7e+00	1.2e+01	3.8e-01	1.8e-03	6.0e-03	1.5e+00	2.5e+00
Pu-244	1.9e+00	8.7e-03	3.0e-02	7.6e+00	1.2e+01	3.8e-01	1.8e-03	5.9e-03	1.5e+00	2.4e+00
Am-241	2.9e+00	1.4e-02	4.6e-02	1.2e+01	1.9e+01	5.8e-01	2.7e-03	9.0e-03	2.3e+00	3.7e+00
Am-242m	2.9e+00	1.3e-02	4.6e-02	1.1e+01	1.9e+01	5.7e-01	2.6e-03	8.9e-03	2.3e+00	3.6e+00
Am-243	2.9e+00	1.3e-02	4.6e-02	1.1e+01	1.9e+01	5.7e-01	2.6e-03	9.0e-03	2.3e+00	3.6e+00
Cm-242	9.5e-02	4.1e-04	1.5e-03	3.7e-01	6.2e-01	1.9e-02	8.3e-05	2.9e-04	7.3e-02	1.2e-01
Cm-243	2.0e+00	9.1e-03	3.2e-02	7.9e+00	1.3e+01	4.0e-01	1.8e-03	6.3e-03	1.6e+00	2.6e+00
Cm-244	1.6e+00	7.3e-03	2.5e-02	6.4e+00	1.1e+01	3.2e-01	1.5e-03	5.0e-03	1.3e+00	2.1e+00
Cm-245	3.0e+00	1.4e-02	4.7e-02	1.2e+01	1.9e+01	5.9e-01	2.7e-03	9.3e-03	2.3e+00	3.8e+00
Cm-246	3.0e+00	1.3e-02	4.7e-02	1.2e+01	1.9e+01	5.9e-01	2.7e-03	9.2e-03	2.3e+00	3.8e+00
Cm-247	2.7e+00	1.2e-02	4.3e-02	1.1e+01	1.8e+01	5.4e-01	2.5e-03	8.5e-03	2.1e+00	3.5e+00
Cm-248	1.1e+01	4.9e-02	1.7e-01	4.3e+01	7.1e+01	2.1e+00	9.9e-03	3.4e-02	8.5e+00	1.4e+01
Bk-249	8.4e-03	3.7e-05	1.3e-04	3.2e-02	5.4e-02	1.7e-03	7.4e-06	2.6e-05	6.5e-03	1.1e-02
Cf-248	3.1e-01	1.3e-03	4.7e-03	1.2e+00	1.9e+00	6.1e-02	2.7e-04	9.2e-04	2.3e-01	3.9e-01
Cf-249	2.6e+00	1.2e-02	3.9e-02	9.9e+00	1.7e+01	5.1e-01	2.3e-03	7.7e-03	2.0e+00	3.3e+00
Cf-250	1.4e+00	6.1e-03	2.1e-02	5.3e+00	8.8e+00	2.7e-01	1.2e-03	4.1e-03	1.0e+00	1.7e+00
Cf-251	2.6e+00	1.2e-02	4.0e-02	1.0e+01	1.7e+01	5.2e-01	2.4e-03	7.9e-03	2.0e+00	3.3e+00
Cf-252	1.0e+00	4.4e-03	1.5e-02	3.9e+00	6.4e+00	2.0e-01	9.0e-04	3.0e-03	7.7e-01	1.3e+00
Cf-254	1.3e+00	5.3e-03	2.0e-02	5.0e+00	8.3e+00	2.6e-01	1.1e-03	4.0e-03	9.9e-01	1.6e+00
Es-254	2.5e-01	1.1e-03	3.9e-03	9.8e-01	1.5e+00	4.9e-02	2.3e-04	7.7e-04	1.9e-01	3.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.27 Normalized effective dose equivalents from external exposure: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	2.3e-05	3.7e-08	1.8e-05	5.3e-05	6.6e-05	4.5e-06	7.4e-09	3.5e-06	1.0e-05	1.3e-05
Na-22	4.2e-01	1.1e-03	4.5e-03	1.6e+00	2.7e+00	8.3e-02	2.2e-04	8.9e-04	3.2e-01	5.3e-01
P-32	3.1e-07	6.7e-10	5.1e-09	9.3e-07	1.9e-06	6.1e-08	1.3e-10	9.9e-10	1.8e-07	3.8e-07
S-35	2.7e-08	9.5e-11	4.4e-10	8.9e-08	1.6e-07	5.4e-09	1.9e-11	8.8e-11	2.0e-08	3.5e-08
Cl-36	1.7e-03	4.0e-04	1.4e-03	3.1e-03	3.7e-03	3.3e-04	8.0e-05	2.9e-04	6.0e-04	7.2e-04
K-40	3.7e-02	9.8e-05	3.9e-04	1.4e-01	2.4e-01	7.3e-03	2.0e-05	7.8e-05	2.8e-02	4.7e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.4e-07	8.9e-10	3.8e-09	8.7e-07	1.5e-06	4.7e-08	1.8e-10	7.5e-10	1.7e-07	3.0e-07
Sc-46	4.9e-03	1.8e-05	7.9e-05	1.8e-02	3.1e-02	9.6e-04	3.6e-06	1.6e-05	3.5e-03	6.2e-03
Cr-51	2.7e-06	2.4e-08	1.3e-07	8.1e-06	1.7e-05	5.3e-07	4.8e-09	2.5e-08	1.6e-06	3.3e-06
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.1e-03	2.0e-05	7.9e-05	3.5e-03	7.0e-03	2.2e-04	4.0e-06	1.6e-05	6.8e-04	1.4e-03
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.9e-04	1.1e-06	5.1e-06	5.7e-04	1.2e-03	3.7e-05	2.1e-07	1.0e-06	1.1e-04	2.4e-04
Co-56	1.2e-03	6.9e-06	3.2e-05	3.7e-03	7.5e-03	2.4e-04	1.4e-06	6.3e-06	7.4e-04	1.5e-03
Co-57	1.4e-04	8.1e-07	3.6e-06	4.3e-04	9.0e-04	2.7e-05	1.6e-07	7.2e-07	8.5e-05	1.8e-04
Co-58	3.0e-04	1.7e-06	8.0e-06	9.4e-04	1.9e-03	6.0e-05	3.5e-07	1.6e-06	1.9e-04	3.7e-04
Co-60	5.3e-03	3.2e-05	1.4e-04	1.7e-02	3.5e-02	1.1e-03	6.4e-06	2.8e-05	3.3e-03	6.8e-03
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	7.9e-02	3.0e-04	1.2e-03	3.0e-01	5.1e-01	1.6e-02	6.0e-05	2.4e-04	6.0e-02	1.0e-01
As-73	1.1e-04	3.5e-07	1.6e-06	4.1e-04	7.0e-04	2.2e-05	7.0e-08	3.2e-07	8.2e-05	1.4e-04
Se-75	3.3e-03	1.1e-04	4.5e-04	1.1e-02	1.9e-02	6.6e-04	2.2e-05	8.8e-05	2.2e-03	3.7e-03
Sr-85	9.1e-04	3.4e-06	1.5e-05	3.4e-03	5.8e-03	1.8e-04	6.7e-07	3.0e-06	6.7e-04	1.2e-03
Sr-89	2.9e-06	1.1e-08	4.9e-08	1.1e-05	1.9e-05	5.8e-07	2.1e-09	9.6e-09	2.2e-06	3.8e-06
Sr-90	9.0e-05	3.4e-07	1.5e-06	3.4e-04	5.9e-04	1.8e-05	7.0e-08	2.9e-07	6.8e-05	1.2e-04
Y-91	9.2e-06	3.4e-08	1.5e-07	3.4e-05	5.9e-05	1.8e-06	6.8e-09	3.0e-08	6.6e-06	1.2e-05
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	1.3e-03	4.7e-06	2.1e-05	4.8e-03	8.2e-03	2.5e-04	9.4e-07	4.2e-06	9.3e-04	1.7e-03
Nb-93m	1.5e-05	5.6e-08	2.4e-07	5.6e-05	9.6e-05	2.9e-06	1.1e-08	4.8e-08	1.1e-05	1.9e-05
Nb-94	2.5e-02	9.5e-05	4.1e-04	9.5e-02	1.6e-01	5.0e-03	1.9e-05	8.1e-05	1.9e-02	3.2e-02
Nb-95	5.8e-04	1.9e-06	9.4e-06	2.1e-03	3.6e-03	1.1e-04	3.9e-07	1.9e-06	4.0e-04	7.3e-04
Mo-93	1.4e-05	8.4e-08	3.7e-07	4.5e-05	9.0e-05	2.7e-06	1.7e-08	7.2e-08	9.1e-06	1.8e-05
Tc-97	1.7e-05	1.0e-07	4.4e-07	6.3e-05	1.1e-04	3.3e-06	2.0e-08	8.7e-08	1.1e-05	2.1e-05
Tc-97m	2.5e-06	1.5e-08	6.7e-08	8.0e-06	1.6e-05	5.0e-07	3.0e-09	1.3e-08	1.6e-06	3.3e-06
Tc-99	2.0e-07	1.2e-09	5.3e-09	6.4e-07	1.3e-06	4.0e-08	2.4e-10	1.0e-09	1.3e-07	2.6e-07
Ru-103	6.5e-05	3.7e-07	1.8e-06	2.0e-04	4.2e-04	1.3e-05	7.4e-08	3.5e-07	4.0e-05	8.3e-05
Ru-106	3.0e-04	1.9e-06	8.0e-06	9.6e-04	2.0e-03	5.9e-05	3.7e-07	1.6e-06	1.9e-04	3.8e-04
Ag-108m	5.2e-03	2.2e-04	1.2e-03	1.3e-02	2.6e-02	1.0e-03	4.5e-05	2.4e-04	2.6e-03	5.3e-03
Ag-110m	3.8e-03	1.6e-04	9.0e-04	9.6e-03	1.9e-02	7.5e-04	3.2e-05	1.8e-04	1.9e-03	3.9e-03
Cd-109	6.7e-03	2.8e-05	1.1e-04	2.6e-02	4.3e-02	1.3e-03	5.5e-06	2.1e-05	5.1e-03	8.6e-03
Sn-113	3.1e-04	9.3e-07	4.1e-06	1.1e-03	2.0e-03	6.0e-05	1.9e-07	8.2e-07	2.2e-04	3.9e-04
Sb-124	5.5e-02	2.1e-05	1.2e-04	2.2e-01	3.6e-01	1.1e-02	4.2e-06	2.3e-05	4.2e-02	7.2e-02
Sb-125	1.1e-01	4.4e-05	2.3e-04	4.3e-01	7.3e-01	2.2e-02	8.6e-06	4.5e-05	8.6e-02	1.4e-01
Te-123m	6.7e-03	4.2e-05	1.7e-04	2.6e-02	4.3e-02	1.3e-03	8.5e-06	3.4e-05	5.1e-03	8.5e-03
Te-127m	8.9e-04	4.4e-06	1.8e-05	2.7e-03	4.5e-03	1.4e-04	8.8e-07	3.5e-06	5.2e-04	8.8e-04
I-125	1.1e-02	2.4e-03	9.3e-03	2.0e-02	2.4e-02	2.1e-03	4.9e-04	1.8e-03	3.9e-03	4.7e-03
I-129	8.5e-02	1.5e-02	5.6e-02	1.2e-01	1.4e-01	1.3e-02	3.0e-03	1.1e-02	2.3e-02	2.7e-02
I-131	2.5e-03	1.5e-04	1.3e-03	6.3e-03	8.8e-03	4.9e-04	2.9e-05	2.6e-04	1.2e-03	1.7e-03
Cs-134	2.9e-01	1.5e-03	5.9e-03	1.1e+00	1.9e+00	5.7e-02	3.0e-04	1.2e-03	2.2e-01	3.6e-01
Cs-135	8.5e-06	4.5e-08	1.8e-07	3.2e-05	5.5e-05	1.7e-06	8.9e-09	3.5e-08	6.4e-06	1.1e-05
Cs-137	1.4e-01	7.3e-04	2.9e-03	5.3e-01	8.9e-01	2.7e-02	1.4e-04	5.6e-04	1.0e-01	1.7e-01
Ba-133	6.1e-03	2.3e-05	1.0e-04	2.3e-02	4.0e-02	1.2e-03	4.6e-06	2.0e-05	4.5e-03	8.0e-03
Ce-139	8.7e-04	2.5e-06	1.1e-05	2.5e-03	4.4e-03	1.3e-04	5.1e-07	2.2e-06	5.0e-04	8.6e-04
Ce-141	5.0e-05	1.7e-07	8.4e-07	1.8e-04	3.2e-04	9.9e-06	3.4e-08	1.6e-07	3.5e-05	6.5e-05
Ce-144	4.5e-04	1.7e-06	7.4e-06	1.7e-03	2.9e-03	8.9e-05	3.4e-07	1.5e-06	3.4e-04	5.8e-04
Pm-147	4.4e-07	1.6e-09	7.2e-09	1.7e-06	2.8e-06	8.7e-08	3.3e-10	1.4e-09	3.3e-07	5.6e-07

Table F1.27 Normalized effective dose equivalents from external exposure: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.2e-08	3.1e-10	1.3e-09	3.1e-07	5.3e-07	1.6e-08	6.3e-11	2.6e-10	6.1e-08	1.1e-07
Eu-152	1.7e-02	6.5e-05	2.8e-04	6.6e-02	1.1e-01	3.4e-03	1.3e-05	5.5e-05	1.3e-02	2.2e-02
Eu-154	1.8e-02	6.9e-05	2.9e-04	7.0e-02	1.2e-01	3.6e-03	1.4e-05	5.8e-05	1.4e-02	2.3e-02
Eu-155	8.6e-04	3.3e-06	1.4e-05	3.3e-03	5.5e-03	1.7e-04	6.6e-07	2.7e-06	6.6e-04	1.1e-03
Gd-153	7.5e-04	2.8e-06	1.2e-05	2.8e-03	4.8e-03	1.5e-04	5.5e-07	2.4e-06	5.5e-04	9.7e-04
Tb-160	2.2e-03	8.3e-06	3.7e-05	8.4e-03	1.4e-02	4.4e-04	1.7e-06	7.3e-06	1.6e-03	2.8e-03
Tm-170	2.4e-05	9.1e-08	3.9e-07	8.9e-05	1.5e-04	4.7e-06	1.8e-08	7.6e-08	1.8e-05	3.0e-05
Tm-171	7.6e-06	2.9e-08	1.2e-07	2.9e-05	4.9e-05	1.5e-06	5.7e-09	2.4e-08	5.7e-06	9.7e-06
Ta-182	4.4e-03	1.6e-05	7.2e-05	1.7e-02	2.9e-02	8.6e-04	3.3e-06	1.4e-05	3.2e-03	5.6e-03
W-181	2.3e-05	1.4e-07	6.2e-07	7.2e-05	1.5e-04	4.6e-06	2.7e-08	1.2e-07	1.4e-05	3.0e-05
W-185	6.3e-08	3.7e-10	1.7e-09	2.0e-07	4.2e-07	1.2e-08	7.3e-11	3.3e-10	3.9e-08	8.1e-08
Os-185	4.0e-02	1.6e-04	6.4e-04	1.5e-01	2.5e-01	7.8e-03	3.2e-05	1.3e-04	3.0e-02	5.2e-02
Ir-192	2.7e-04	1.6e-06	7.2e-06	8.7e-04	1.8e-03	5.3e-05	3.1e-07	1.4e-06	1.7e-04	3.4e-04
Tl-204	4.0e-04	1.7e-06	6.5e-06	1.5e-03	2.6e-03	7.9e-05	3.3e-07	1.3e-06	3.1e-04	5.1e-04
Pb-210	1.1e-03	4.6e-06	1.8e-05	4.2e-03	7.1e-03	2.2e-04	9.1e-07	3.5e-06	8.4e-04	1.4e-03
Bi-207	4.7e-01	1.9e-03	7.5e-03	1.6e+00	3.1e+00	9.3e-02	3.8e-04	1.5e-03	3.6e-01	6.0e-01
Po-210	7.3e-07	2.9e-09	1.1e-08	2.6e-06	4.8e-06	1.4e-07	5.7e-10	2.3e-09	5.5e-07	9.4e-07
Ra-226	2.7e-02	1.0e-04	4.5e-04	1.0e-01	1.8e-01	5.3e-03	2.1e-05	8.8e-05	2.0e-02	3.5e-02
Ra-228	1.4e-02	5.1e-05	2.2e-04	5.1e-02	8.8e-02	2.7e-03	1.0e-05	4.4e-05	1.0e-02	1.7e-02
Ac-227	6.2e-03	2.3e-05	1.0e-04	2.3e-02	3.9e-02	1.2e-03	4.6e-06	2.0e-05	4.7e-03	7.7e-03
Th-228	1.7e-02	6.4e-05	2.7e-04	6.4e-02	1.1e-01	3.3e-03	1.3e-05	5.4e-05	1.3e-02	2.1e-02
Th-229	5.2e-03	2.0e-05	8.5e-05	2.0e-02	3.3e-02	1.0e-03	4.0e-06	1.7e-05	3.9e-03	6.6e-03
Th-230	1.2e-05	4.7e-08	2.0e-07	4.7e-05	7.9e-05	2.5e-06	9.4e-09	3.9e-08	9.2e-06	1.6e-05
Th-232	9.1e-06	3.4e-08	1.5e-07	3.4e-05	5.8e-05	1.8e-06	6.9e-09	2.9e-08	6.8e-06	1.1e-05
Pa-231	6.7e-04	2.5e-06	1.1e-05	2.5e-03	4.3e-03	1.3e-04	5.0e-07	2.1e-06	5.0e-04	8.6e-04
U-232	1.6e-05	6.3e-08	2.7e-07	6.3e-05	1.1e-04	3.2e-06	1.3e-08	5.3e-08	1.2e-05	2.1e-05
U-233	1.2e-05	4.5e-08	1.9e-07	4.5e-05	7.6e-05	2.3e-06	9.0e-09	3.8e-08	8.9e-06	1.5e-05
U-234	1.2e-05	4.7e-08	2.0e-07	4.7e-05	8.0e-05	2.4e-06	9.4e-09	3.9e-08	9.3e-06	1.6e-05
U-235	2.7e-03	1.0e-05	4.5e-05	1.0e-02	1.8e-02	5.4e-04	2.1e-06	8.8e-06	2.1e-03	3.5e-03
U-236	1.1e-05	4.1e-08	1.7e-07	4.1e-05	6.9e-05	2.1e-06	8.1e-09	3.4e-08	8.1e-06	1.4e-05
U-238	4.5e-04	1.7e-06	7.3e-06	1.7e-03	2.9e-03	8.8e-05	3.4e-07	1.4e-06	3.4e-04	5.7e-04
Np-237	3.7e-03	1.4e-05	6.0e-05	1.4e-02	2.3e-02	7.3e-04	2.8e-06	1.2e-05	2.7e-03	4.7e-03
Pu-236	1.3e-05	4.9e-08	2.1e-07	4.9e-05	8.3e-05	2.6e-06	9.9e-09	4.2e-08	9.7e-06	1.7e-05
Pu-238	1.4e-05	5.2e-08	2.2e-07	5.2e-05	8.8e-05	2.7e-06	1.0e-08	4.4e-08	1.0e-05	1.7e-05
Pu-239	6.0e-06	2.3e-08	9.8e-08	2.3e-05	3.9e-05	1.2e-06	4.6e-09	1.9e-08	4.5e-06	7.7e-06
Pu-240	1.3e-05	5.0e-08	2.1e-07	5.0e-05	8.5e-05	2.6e-06	1.0e-08	4.2e-08	9.9e-06	1.7e-05
Pu-241	3.0e-08	1.2e-10	4.9e-10	1.1e-07	1.9e-07	6.0e-09	2.3e-11	9.7e-11	2.3e-08	3.9e-08
Pu-242	1.1e-05	4.2e-08	1.8e-07	4.1e-05	7.0e-05	2.2e-06	8.3e-09	3.5e-08	8.2e-06	1.4e-05
Pu-244	5.5e-03	2.1e-05	8.9e-05	2.1e-02	3.5e-02	1.1e-03	4.2e-06	1.8e-05	4.1e-03	7.0e-03
Am-241	4.5e-04	1.7e-06	7.3e-06	1.8e-03	2.9e-03	8.9e-05	3.4e-07	1.4e-06	3.5e-04	5.7e-04
Am-242m	3.6e-04	1.4e-06	5.8e-06	1.4e-03	2.3e-03	7.1e-05	2.7e-07	1.1e-06	2.8e-04	4.5e-04
Am-243	3.6e-03	1.3e-05	5.8e-05	1.4e-02	2.3e-02	7.0e-04	2.7e-06	1.1e-05	2.7e-03	4.5e-03
Cm-242	4.9e-06	1.9e-08	7.9e-08	1.8e-05	3.2e-05	9.6e-07	3.7e-09	1.6e-08	3.6e-06	6.3e-06
Cm-243	2.0e-03	7.6e-06	3.3e-05	7.5e-03	1.3e-02	4.0e-04	1.5e-06	6.4e-06	1.5e-03	2.6e-03
Cm-244	1.4e-05	5.3e-08	2.3e-07	5.2e-05	9.1e-05	2.8e-06	1.1e-08	4.5e-08	1.0e-05	1.8e-05
Cm-245	1.4e-03	5.4e-06	2.3e-05	5.3e-03	9.4e-03	2.8e-04	1.1e-06	4.6e-06	1.1e-03	1.8e-03
Cm-246	1.5e-05	4.9e-08	2.1e-07	4.9e-05	8.5e-05	2.5e-06	9.7e-09	4.1e-08	9.6e-06	1.7e-05
Cm-247	5.5e-03	2.1e-05	8.9e-05	2.0e-02	3.6e-02	1.1e-03	4.1e-06	1.8e-05	4.1e-03	7.1e-03
Cm-248	9.8e-06	3.7e-08	1.6e-07	3.7e-05	6.5e-05	1.9e-06	7.4e-09	3.2e-08	7.4e-06	1.3e-05
Bk-249	5.9e-08	2.2e-10	9.4e-10	2.2e-07	3.7e-07	1.2e-08	4.5e-11	1.9e-10	4.4e-08	7.5e-08
Cf-248	6.8e-06	2.5e-08	1.1e-07	2.6e-05	4.4e-05	1.3e-06	5.1e-09	2.1e-08	5.1e-06	8.8e-06
Cf-249	5.4e-03	2.0e-05	8.7e-05	2.1e-02	3.5e-02	1.1e-03	4.1e-06	1.7e-05	4.1e-03	7.1e-03
Cf-250	1.2e-05	4.3e-08	1.9e-07	4.4e-05	7.6e-05	2.3e-06	8.8e-09	3.7e-08	8.7e-06	1.5e-05
Cf-251	2.0e-03	7.5e-06	3.2e-05	7.6e-03	1.3e-02	4.0e-04	1.5e-06	6.4e-06	1.5e-03	2.6e-03
Cf-252	9.5e-06	3.5e-08	1.5e-07	3.6e-05	6.2e-05	1.9e-06	7.1e-09	3.0e-08	7.1e-06	1.2e-05
Cf-254	4.0e-09	1.4e-11	6.5e-11	1.5e-08	2.6e-08	8.0e-10	2.9e-12	1.3e-11	2.9e-09	5.2e-09
Es-254	6.6e-03	2.5e-05	1.1e-04	2.5e-02	4.2e-02	1.3e-03	5.0e-06	2.2e-05	5.0e-03	8.4e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.28 Normalized effective dose equivalents from inhalation: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.0e-04	3.9e-05	9.5e-05	1.7e-04	2.0e-04	2.1e-05	7.9e-06	1.9e-05	3.4e-05	3.9e-05
C-14	1.3e-05	2.4e-08	1.1e-05	2.9e-05	3.5e-05	2.5e-06	4.8e-09	2.1e-06	5.6e-06	7.0e-06
Na-22	7.4e-04	2.3e-06	7.5e-06	2.9e-03	4.8e-03	1.5e-04	4.7e-07	1.5e-06	5.8e-04	9.4e-04
P-32	7.0e-06	1.7e-08	1.1e-07	2.2e-05	4.2e-05	1.4e-06	3.4e-09	2.2e-08	4.3e-06	8.4e-06
S-35	7.4e-06	2.9e-08	1.2e-07	2.8e-05	4.7e-05	1.5e-06	5.7e-09	2.3e-08	5.5e-06	9.2e-06
Cl-36	2.1e-02	6.2e-03	1.9e-02	3.7e-02	4.5e-02	4.2e-03	1.3e-03	3.7e-03	7.4e-03	8.7e-03
K-40	1.2e-03	3.9e-06	1.3e-05	4.9e-03	7.8e-03	2.4e-04	7.8e-07	2.5e-06	9.7e-04	1.5e-03
Ca-41	8.8e-06	3.9e-08	1.4e-07	3.4e-05	5.7e-05	1.7e-06	7.9e-09	2.7e-08	6.8e-06	1.1e-05
Ca-45	3.6e-05	1.6e-07	5.7e-07	1.4e-04	2.3e-04	7.2e-06	3.1e-08	1.1e-07	2.8e-05	4.6e-05
Sc-46	1.4e-04	5.9e-07	2.2e-06	5.4e-04	8.9e-04	2.6e-05	1.2e-07	4.4e-07	1.1e-04	1.8e-04
Cr-51	1.6e-07	1.6e-09	7.7e-09	5.0e-07	1.0e-06	3.2e-08	3.3e-10	1.5e-09	1.0e-07	2.0e-07
Mn-53	5.3e-07	1.1e-08	3.6e-08	1.7e-06	3.4e-06	1.0e-07	2.3e-09	7.1e-09	3.3e-07	6.7e-07
Mn-54	6.4e-06	1.3e-07	4.4e-07	2.0e-05	4.1e-05	1.3e-06	2.7e-08	8.6e-08	3.9e-06	8.1e-06
Fe-55	1.3e-06	9.1e-09	3.3e-08	4.2e-06	8.5e-06	2.5e-07	1.8e-09	6.6e-09	8.4e-07	1.7e-06
Fe-59	7.2e-06	4.6e-08	1.9e-07	2.3e-05	4.6e-05	1.4e-06	9.1e-09	3.8e-08	4.6e-06	9.3e-06
Co-56	2.9e-05	1.9e-07	7.5e-07	9.4e-05	1.8e-04	5.7e-06	3.7e-08	1.5e-07	1.9e-05	3.6e-05
Co-57	8.1e-06	5.4e-08	2.1e-07	2.7e-05	5.2e-05	1.6e-06	1.1e-08	4.1e-08	5.3e-06	1.0e-05
Co-58	7.7e-06	5.0e-08	2.0e-07	2.5e-05	4.9e-05	1.5e-06	9.8e-09	3.9e-08	4.9e-06	9.7e-06
Co-60	2.2e-04	1.5e-06	5.5e-06	7.2e-04	1.4e-03	4.3e-05	2.9e-07	1.1e-06	1.4e-04	2.7e-04
Ni-59	8.4e-07	5.6e-09	2.4e-08	3.1e-06	6.3e-06	1.9e-07	1.3e-09	4.7e-09	6.0e-07	1.2e-06
Ni-63	2.4e-06	1.6e-08	6.0e-08	7.7e-06	1.6e-05	4.6e-07	3.3e-09	1.2e-08	1.5e-06	3.1e-06
Zn-65	2.3e-03	1.0e-05	3.4e-05	9.2e-03	1.5e-02	4.6e-04	2.1e-06	6.7e-06	1.9e-03	2.9e-03
As-73	1.3e-04	4.5e-07	1.8e-06	4.8e-04	8.3e-04	2.5e-05	9.0e-08	3.5e-07	9.5e-05	1.6e-04
Se-75	1.0e-04	3.9e-06	1.3e-05	3.5e-04	5.7e-04	2.0e-05	7.9e-07	2.6e-06	6.9e-05	1.1e-04
Sr-85	8.5e-06	3.5e-08	1.4e-07	3.2e-05	5.3e-05	1.7e-06	7.0e-09	2.7e-08	6.4e-06	1.1e-05
Sr-89	2.6e-05	1.1e-07	4.3e-07	9.9e-05	1.7e-04	5.2e-06	2.1e-08	8.4e-08	2.0e-05	3.3e-05
Sr-90	1.6e-03	7.2e-06	2.5e-05	6.3e-03	1.0e-02	3.1e-04	1.4e-06	5.0e-06	1.2e-03	2.0e-03
Y-91	2.1e-04	8.7e-07	3.4e-06	8.1e-04	1.3e-03	4.1e-05	1.8e-07	6.7e-07	1.6e-04	2.6e-04
Zr-93	5.3e-04	2.3e-06	8.5e-06	2.1e-03	3.3e-03	1.0e-04	4.8e-07	1.7e-06	4.1e-04	6.5e-04
Zr-95	8.9e-05	2.9e-07	1.1e-06	2.6e-04	4.3e-04	1.4e-05	5.8e-08	2.2e-07	5.3e-05	8.5e-05
Nb-93m	1.9e-04	8.3e-07	2.9e-06	7.4e-04	1.2e-03	3.7e-05	1.7e-07	5.8e-07	1.5e-04	2.4e-04
Nb-94	2.7e-03	1.2e-05	4.2e-05	1.1e-02	1.7e-02	5.3e-04	2.4e-06	8.2e-06	2.1e-03	3.4e-03
Nb-95	2.0e-05	7.8e-08	3.2e-07	7.5e-05	1.3e-04	4.0e-06	1.6e-08	6.3e-08	1.5e-05	2.5e-05
Mo-93	2.9e-05	2.0e-07	7.4e-07	9.7e-05	1.8e-04	5.7e-06	4.1e-08	1.5e-07	2.0e-05	3.7e-05
Tc-97	1.0e-06	7.0e-09	2.6e-08	3.4e-06	6.6e-06	2.0e-07	1.4e-09	5.2e-09	6.7e-07	1.3e-06
Tc-97m	3.7e-06	2.4e-08	9.7e-08	1.2e-05	2.4e-05	7.3e-07	4.9e-09	1.9e-08	2.4e-06	4.7e-06
Tc-99	8.5e-06	5.9e-08	2.2e-07	2.9e-05	5.5e-05	1.7e-06	1.2e-08	4.3e-08	5.6e-06	1.1e-05
Ru-103	5.0e-06	3.1e-08	1.3e-07	1.6e-05	3.2e-05	9.8e-07	6.3e-09	2.6e-08	3.2e-06	6.3e-06
Ru-106	4.3e-04	3.0e-06	1.1e-05	1.4e-03	2.7e-03	8.6e-05	6.1e-07	2.3e-06	2.9e-04	5.6e-04
Ag-108m	3.8e-05	2.0e-08	8.9e-06	1.0e-04	2.0e-04	7.5e-06	3.9e-07	1.8e-06	2.1e-05	4.0e-05
Ag-110m	4.4e-05	2.2e-06	1.0e-05	1.2e-04	2.3e-04	8.8e-06	4.5e-07	2.1e-06	2.4e-05	4.6e-05
Cd-109	5.5e-03	2.6e-05	8.5e-05	2.2e-02	3.5e-02	1.1e-03	5.4e-06	1.7e-05	4.4e-03	6.9e-03
Sn-113	1.7e-05	5.8e-08	2.2e-07	8.4e-05	1.1e-04	3.3e-06	1.1e-08	4.4e-08	1.3e-05	2.1e-05
Sb-124	2.1e-03	9.0e-07	4.3e-06	8.3e-03	1.4e-02	4.2e-04	1.8e-07	8.4e-07	1.7e-03	2.7e-03
Sb-125	1.7e-03	7.6e-07	3.4e-06	6.9e-03	1.1e-02	3.3e-04	1.5e-07	6.7e-07	1.4e-03	2.1e-03
Te-123m	6.8e-04	4.9e-06	1.7e-05	2.6e-03	4.3e-03	1.3e-04	9.9e-07	3.3e-06	5.3e-04	8.5e-04
Te-127m	1.4e-03	9.9e-06	3.4e-05	5.4e-03	8.6e-03	2.7e-04	2.0e-06	6.6e-06	1.1e-03	1.7e-03
I-125	1.6e-02	4.3e-03	1.4e-02	2.9e-02	3.5e-02	3.1e-03	8.6e-04	2.7e-03	5.6e-03	6.9e-03
I-129	1.7e-01	4.9e-02	1.5e-01	3.0e-01	3.6e-01	3.3e-02	9.9e-03	2.9e-02	5.8e-02	6.9e-02
I-131	4.2e-03	2.7e-04	2.2e-03	1.1e-02	1.4e-02	8.2e-04	5.4e-05	4.3e-04	2.1e-03	2.8e-03
Cs-134	4.4e-03	2.7e-05	8.8e-05	1.8e-02	2.8e-02	8.8e-04	5.5e-06	1.7e-05	3.4e-03	5.5e-03
Cs-135	4.6e-04	2.8e-06	9.0e-06	1.8e-03	2.9e-03	9.0e-05	5.8e-07	1.8e-06	3.6e-04	5.7e-04
Cs-137	3.2e-03	2.0e-05	6.3e-05	1.3e-02	2.0e-02	6.3e-04	4.0e-06	1.2e-05	2.5e-03	4.0e-03
Ba-133	5.0e-05	2.2e-07	7.9e-07	1.9e-04	3.2e-04	9.9e-06	4.5e-08	1.5e-07	3.9e-05	6.3e-05
Ce-139	4.8e-05	2.1e-07	7.5e-07	1.8e-04	3.0e-04	9.4e-06	4.2e-08	1.5e-07	3.7e-05	5.9e-05
Ce-141	2.9e-05	1.1e-07	4.8e-07	1.1e-04	1.8e-04	5.8e-06	2.2e-08	9.4e-08	2.1e-05	3.6e-05
Ce-144	2.2e-03	9.6e-06	3.4e-05	8.4e-03	1.3e-02	4.3e-04	1.9e-06	6.8e-06	1.6e-03	2.7e-03
Pm-147	2.5e-04	1.1e-06	3.8e-06	9.5e-04	1.6e-03	4.8e-05	2.2e-07	7.5e-07	1.9e-04	3.1e-04

Table F1.28 Normalized effective dose equivalents from inhalation: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.9e-04	8.6e-07	3.1e-06	7.5e-04	1.2e-03	3.8e-05	1.7e-07	6.0e-07	1.5e-04	2.4e-04
Eu-152	1.4e-03	6.2e-06	2.2e-05	5.6e-03	9.1e-03	2.8e-04	1.2e-06	4.4e-06	1.1e-03	1.8e-03
Eu-154	1.8e-03	8.0e-06	2.9e-05	7.2e-03	1.2e-02	3.6e-04	1.6e-06	5.6e-06	1.4e-03	2.4e-03
Eu-155	2.6e-04	1.1e-06	4.1e-06	1.0e-03	1.7e-03	5.2e-05	2.3e-07	8.1e-07	2.0e-04	3.4e-04
Gd-153	5.4e-05	2.3e-07	8.5e-07	2.1e-04	3.5e-04	1.1e-05	4.7e-08	1.7e-07	4.2e-05	6.8e-05
Tb-160	1.1e-04	4.8e-07	1.8e-06	4.3e-04	7.2e-04	2.3e-05	9.5e-08	3.6e-07	8.7e-05	1.4e-04
Tm-170	1.4e-04	5.8e-07	2.2e-06	5.3e-04	8.6e-04	2.7e-05	1.2e-07	4.2e-07	1.0e-04	1.7e-04
Tm-171	5.6e-05	2.5e-07	8.8e-07	2.2e-04	3.5e-04	1.1e-05	4.9e-08	1.7e-07	4.3e-05	7.0e-05
Ta-182	2.3e-04	9.7e-07	3.6e-06	8.8e-04	1.4e-03	4.5e-05	1.9e-07	7.1e-07	1.7e-04	2.8e-04
W-181	1.2e-07	8.2e-10	3.2e-09	4.0e-07	7.9e-07	2.4e-08	1.6e-10	6.3e-10	7.9e-08	1.6e-07
W-185	5.3e-07	3.6e-09	1.4e-08	1.8e-06	3.5e-06	1.1e-07	7.1e-10	2.8e-09	3.5e-07	6.9e-07
Os-185	9.6e-04	4.4e-06	1.5e-05	3.7e-03	6.1e-03	1.9e-04	8.8e-07	2.9e-06	7.5e-04	1.2e-03
Ir-192	2.0e-05	1.3e-07	5.4e-07	6.8e-05	1.3e-04	4.0e-06	2.6e-08	1.1e-07	1.4e-05	2.6e-05
Tl-204	2.8e-04	1.4e-06	4.6e-06	1.2e-03	1.9e-03	5.8e-05	2.9e-07	9.0e-07	2.3e-04	3.7e-04
Pb-210	2.8e+00	1.4e-02	4.3e-02	1.1e+01	1.8e+01	5.5e-01	2.8e-03	8.6e-03	2.2e+00	3.5e+00
Bi-207	2.5e-03	1.2e-05	3.9e-05	1.0e-02	1.6e-02	5.0e-04	2.5e-06	7.7e-06	2.0e-03	3.2e-03
Po-210	9.2e-01	4.1e-03	1.4e-02	3.6e+00	5.9e+00	1.8e-01	8.3e-04	2.7e-03	7.2e-01	1.2e+00
Ra-226	5.5e-02	2.5e-04	8.7e-04	2.2e-01	3.5e-01	1.1e-02	5.0e-05	1.7e-04	4.3e-02	6.9e-02
Ra-228	3.1e-02	1.4e-04	4.8e-04	1.2e-01	2.0e-01	6.1e-03	2.8e-05	9.6e-05	2.4e-02	3.9e-02
Ac-227	8.4e+00	3.8e-02	1.3e-01	3.3e+01	5.3e+01	1.7e+00	7.7e-03	2.6e-02	6.5e+00	1.1e+01
Th-228	2.1e+00	9.3e-03	3.3e-02	8.4e+00	1.4e+01	4.2e-01	1.9e-03	6.6e-03	1.6e+00	2.7e+00
Th-229	1.1e+01	5.0e-02	1.8e-01	4.4e+01	7.2e+01	2.2e+00	1.0e-02	3.5e-02	8.8e+00	1.4e+01
Th-230	1.7e+00	7.5e-03	2.7e-02	6.6e+00	1.1e+01	3.4e-01	1.5e-03	5.2e-03	1.3e+00	2.1e+00
Th-232	7.5e+00	3.3e-02	1.2e-01	2.9e+01	4.7e+01	1.5e+00	6.6e-03	2.3e-02	5.8e+00	9.3e+00
Pa-231	5.6e+00	2.5e-02	8.7e-02	2.2e+01	3.6e+01	1.1e+00	4.9e-03	1.7e-02	4.3e+00	7.1e+00
U-232	4.3e+00	1.9e-02	6.8e-02	1.7e+01	2.7e+01	8.5e-01	3.8e-03	1.3e-02	3.4e+00	5.4e+00
U-233	6.8e-01	3.9e-03	1.4e-02	3.4e+00	5.5e+00	1.7e-01	7.9e-04	2.7e-03	6.9e-01	1.1e+00
U-234	6.6e-01	3.8e-03	1.4e-02	3.4e+00	5.4e+00	1.7e-01	7.7e-04	2.7e-03	6.8e-01	1.1e+00
U-235	6.0e-01	3.6e-03	1.3e-02	3.1e+00	5.0e+00	1.6e-01	7.2e-04	2.5e-03	6.3e-01	1.0e+00
U-236	6.2e-01	3.6e-03	1.3e-02	3.2e+00	5.1e+00	1.6e-01	7.3e-04	2.5e-03	6.4e-01	1.0e+00
U-238	7.7e-01	3.4e-03	1.2e-02	3.0e+00	4.8e+00	1.5e-01	6.9e-04	2.4e-03	6.0e-01	9.7e-01
Np-237	3.5e+00	1.8e-02	5.5e-02	1.3e+01	2.2e+01	6.9e-01	3.1e-03	1.1e-02	2.5e+00	4.4e+00
Pu-236	6.1e-01	3.5e-03	1.3e-02	3.1e+00	5.1e+00	1.6e-01	7.1e-04	2.5e-03	6.2e-01	1.0e+00
Pu-238	1.9e+00	8.1e-03	2.9e-02	7.3e+00	1.2e+01	3.7e-01	1.6e-03	5.7e-03	1.4e+00	2.4e+00
Pu-239	2.0e+00	8.7e-03	3.1e-02	7.8e+00	1.3e+01	3.9e-01	1.8e-03	6.1e-03	1.5e+00	2.5e+00
Pu-240	2.0e+00	8.7e-03	3.1e-02	7.8e+00	1.3e+01	3.9e-01	1.8e-03	6.1e-03	1.5e+00	2.5e+00
Pu-241	3.2e-02	1.4e-04	5.0e-04	1.2e-01	2.0e-01	6.3e-03	2.8e-05	9.8e-05	2.4e-02	4.0e-02
Pu-242	1.9e+00	8.3e-03	3.0e-02	7.4e+00	1.2e+01	3.7e-01	1.7e-03	5.8e-03	1.4e+00	2.4e+00
Pu-244	1.9e+00	8.2e-03	2.9e-02	7.3e+00	1.2e+01	3.7e-01	1.7e-03	5.7e-03	1.4e+00	2.4e+00
Am-241	2.9e+00	1.3e-02	4.5e-02	1.1e+01	1.8e+01	5.7e-01	2.6e-03	8.8e-03	2.2e+00	3.6e+00
Am-242m	2.8e+00	1.3e-02	4.5e-02	1.1e+01	1.8e+01	5.6e-01	2.5e-03	8.8e-03	2.2e+00	3.5e+00
Am-243	2.8e+00	1.3e-02	4.5e-02	1.1e+01	1.8e+01	5.6e-01	2.5e-03	8.8e-03	2.2e+00	3.5e+00
Cm-242	9.3e-02	4.0e-04	1.5e-03	3.6e-01	6.0e-01	1.8e-02	8.0e-05	2.9e-04	7.1e-02	1.2e-01
Cm-243	2.0e+00	8.7e-03	3.1e-02	7.7e+00	1.3e+01	3.9e-01	1.7e-03	6.1e-03	1.5e+00	2.5e+00
Cm-244	1.6e+00	7.0e-03	2.5e-02	6.2e+00	1.0e+01	3.1e-01	1.4e-03	4.9e-03	1.2e+00	2.0e+00
Cm-245	2.9e+00	1.3e-02	4.6e-02	1.1e+01	1.9e+01	5.8e-01	2.6e-03	9.1e-03	2.3e+00	3.8e+00
Cm-246	2.9e+00	1.3e-02	4.6e-02	1.1e+01	1.9e+01	5.7e-01	2.6e-03	9.1e-03	2.3e+00	3.7e+00
Cm-247	2.7e+00	1.2e-02	4.2e-02	1.0e+01	1.7e+01	5.3e-01	2.4e-03	8.3e-03	2.1e+00	3.4e+00
Cm-248	1.1e+01	4.7e-02	1.7e-01	4.2e+01	7.0e+01	2.1e+00	9.4e-03	3.3e-02	8.3e+00	1.4e+01
Bk-249	8.2e-03	3.5e-05	1.3e-04	3.2e-02	5.2e-02	1.6e-03	7.1e-06	2.5e-05	6.3e-03	1.0e-02
Cf-248	3.0e-01	1.3e-03	4.6e-03	1.1e+00	1.9e+00	6.0e-02	2.6e-04	9.1e-04	2.3e-01	3.8e-01
Cf-249	2.5e+00	1.1e-02	3.8e-02	9.5e+00	1.6e+01	4.9e-01	2.2e-03	7.5e-03	1.9e+00	3.2e+00
Cf-250	1.3e+00	5.8e-03	2.0e-02	5.1e+00	8.6e+00	2.6e-01	1.2e-03	4.0e-03	1.0e+00	1.7e+00
Cf-251	2.5e+00	1.1e-02	3.9e-02	9.7e+00	1.6e+01	5.0e-01	2.2e-03	7.6e-03	1.9e+00	3.2e+00
Cf-252	9.9e-01	4.3e-03	1.5e-02	3.8e+00	6.3e+00	2.0e-01	8.7e-04	3.0e-03	7.5e-01	1.3e+00
Cf-254	1.3e+00	5.2e-03	2.0e-02	4.9e+00	8.1e+00	2.6e-01	1.0e-03	3.9e-03	9.7e-01	1.6e+00
Es-254	2.4e-01	1.0e-03	3.7e-03	9.3e-01	1.5e+00	4.8e-02	2.1e-04	7.3e-04	1.8e-01	2.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.29 Normalized effective dose equivalents from ingestion: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	4.5e-05	1.2e-05	3.6e-05	8.4e-05	1.1e-04	8.9e-06	2.5e-06	7.0e-06	1.7e-05	2.1e-05
C-14	1.0e-04	1.6e-07	7.0e-05	2.4e-04	3.3e-04	2.1e-05	3.1e-08	1.4e-05	4.6e-05	6.5e-05
Na-22	2.1e-02	6.4e-05	2.2e-04	8.1e-02	1.4e-01	4.1e-03	1.3e-05	4.3e-05	1.6e-02	2.7e-02
P-32	4.9e-05	1.1e-07	7.9e-07	1.5e-04	2.9e-04	9.7e-06	2.2e-08	1.6e-07	2.9e-05	5.9e-05
S-35	5.3e-05	1.0e-07	7.5e-07	1.4e-04	2.9e-04	1.0e-05	2.0e-08	1.5e-07	2.8e-05	5.7e-05
Cl-36	1.3e+00	9.3e-02	6.3e-01	3.1e+00	4.8e+00	2.6e-01	1.9e-02	1.2e-01	6.1e-01	9.4e-01
K-40	1.8e-02	5.4e-05	1.8e-04	6.5e-02	1.1e-01	3.6e-03	1.1e-05	3.6e-05	1.3e-02	2.1e-02
Ca-41	8.1e-05	2.3e-07	9.0e-07	2.0e-04	3.6e-04	1.2e-05	4.6e-08	1.8e-07	4.0e-05	7.0e-05
Ca-45	7.8e-05	3.6e-07	1.2e-06	2.9e-04	4.9e-04	1.5e-05	7.3e-08	2.4e-07	5.7e-05	9.6e-05
Sc-46	1.1e-04	5.2e-07	1.8e-06	4.2e-04	7.0e-04	2.2e-05	1.1e-07	3.5e-07	8.4e-05	1.4e-04
Cr-51	2.5e-07	2.7e-09	1.2e-08	7.6e-07	1.5e-06	4.9e-08	5.5e-10	2.3e-09	1.5e-07	3.1e-07
Mn-53	5.1e-07	1.2e-08	3.8e-08	1.6e-06	3.2e-06	1.0e-07	2.4e-09	7.1e-09	3.1e-07	6.1e-07
Mn-54	9.6e-06	2.4e-07	6.7e-07	3.1e-05	6.0e-05	1.9e-06	4.8e-08	1.3e-07	6.1e-06	1.2e-05
Fe-55	3.5e-06	2.6e-08	9.2e-08	1.1e-05	2.3e-05	6.9e-07	5.2e-09	1.8e-08	2.2e-06	4.5e-06
Fe-59	1.6e-05	1.1e-07	5.4e-07	5.1e-05	1.0e-04	3.2e-06	2.3e-08	8.6e-08	9.9e-06	2.0e-05
Co-56	4.8e-05	2.7e-07	1.2e-06	1.4e-04	2.8e-04	9.5e-06	5.3e-08	2.4e-07	2.7e-05	5.5e-05
Co-57	5.4e-06	3.0e-08	1.3e-07	1.5e-05	3.1e-05	1.1e-06	6.0e-09	2.6e-08	3.0e-06	6.1e-06
Co-58	1.3e-05	7.4e-08	3.3e-07	3.8e-05	7.8e-05	2.7e-06	1.5e-08	6.6e-08	7.5e-06	1.6e-05
Co-60	8.8e-05	4.9e-07	2.2e-06	2.5e-04	5.1e-04	1.7e-05	9.8e-08	4.3e-07	5.0e-05	1.0e-04
Ni-59	1.6e-06	1.1e-08	4.1e-08	4.8e-06	1.0e-05	3.2e-07	2.1e-09	8.1e-09	9.5e-07	2.0e-06
Ni-63	4.5e-06	2.9e-08	1.1e-07	1.3e-05	2.8e-05	8.8e-07	5.9e-09	2.2e-08	2.6e-06	5.5e-06
Zn-65	3.3e-02	1.2e-04	4.9e-04	1.2e-01	2.1e-01	6.5e-03	2.5e-05	9.7e-05	2.4e-02	4.1e-02
As-73	1.3e-04	4.2e-07	1.8e-06	4.5e-04	7.7e-04	2.6e-05	8.4e-08	3.5e-07	9.0e-05	1.5e-04
Se-75	2.2e-03	5.2e-05	2.8e-04	5.8e-03	1.1e-02	4.3e-04	1.0e-05	5.5e-05	1.1e-03	2.2e-03
Sr-85	3.1e-05	1.6e-07	5.0e-07	1.2e-04	2.0e-04	6.1e-06	3.3e-08	9.9e-08	2.4e-05	3.9e-05
Sr-89	1.2e-04	6.2e-07	2.0e-06	4.7e-04	7.8e-04	2.4e-05	1.3e-07	3.9e-07	9.3e-05	1.5e-04
Sr-90	6.4e-03	3.0e-05	1.0e-04	2.4e-02	3.9e-02	1.3e-03	6.0e-06	2.0e-05	4.7e-03	7.8e-03
Y-91	9.0e-05	4.8e-07	1.4e-06	3.6e-04	5.9e-04	1.8e-05	9.6e-08	2.8e-07	7.1e-05	1.2e-04
Zr-93	2.7e-05	1.5e-07	4.4e-07	1.1e-04	1.7e-04	5.3e-06	3.0e-08	8.5e-08	2.2e-05	3.4e-05
Zr-95	3.3e-05	1.8e-07	5.5e-07	1.3e-04	2.1e-04	6.6e-06	3.6e-08	1.1e-07	2.7e-05	4.3e-05
Nb-93m	8.8e-06	4.8e-08	1.4e-07	3.6e-05	5.6e-05	1.7e-06	9.6e-09	2.7e-08	7.2e-06	1.1e-05
Nb-94	1.2e-04	6.6e-07	1.9e-06	5.0e-04	7.8e-04	2.4e-05	1.3e-07	3.7e-07	9.9e-05	1.5e-04
Nb-95	1.4e-05	6.9e-08	2.3e-07	5.7e-05	9.0e-05	2.8e-06	1.4e-08	4.5e-08	1.1e-05	1.8e-05
Mo-93	5.0e-06	3.9e-08	1.3e-07	1.7e-05	3.3e-05	9.9e-07	7.8e-09	2.6e-08	3.3e-06	6.3e-06
Tc-97	5.8e-06	2.1e-08	1.3e-07	1.5e-05	3.4e-05	1.2e-06	4.1e-09	2.6e-08	2.8e-06	6.7e-06
Tc-97m	7.9e-06	4.0e-08	1.9e-07	2.3e-05	4.8e-05	1.6e-06	8.0e-09	3.8e-08	4.5e-06	9.6e-06
Tc-99	5.0e-05	1.8e-07	1.1e-06	1.3e-04	2.9e-04	9.9e-06	3.5e-08	2.2e-07	2.4e-05	5.7e-05
Ru-103	3.3e-06	2.6e-08	9.0e-08	1.1e-05	2.2e-05	6.5e-07	5.2e-09	1.8e-08	2.2e-06	4.4e-06
Ru-106	7.3e-05	6.2e-07	1.9e-06	2.5e-04	4.9e-04	1.4e-05	1.2e-07	3.8e-07	5.0e-05	9.7e-05
Ag-108m	3.8e-05	2.3e-06	9.1e-06	1.0e-04	2.0e-04	7.6e-06	4.5e-07	1.8e-06	2.0e-05	3.9e-05
Ag-110m	4.7e-05	2.7e-06	1.1e-05	1.2e-04	2.4e-04	9.2e-06	5.4e-07	2.2e-06	2.5e-05	4.8e-05
Cd-109	9.4e-03	4.2e-05	1.4e-04	3.3e-02	5.6e-02	1.9e-03	8.4e-06	2.8e-05	6.5e-03	1.1e-02
Sn-113	2.4e-05	8.2e-08	3.1e-07	8.7e-05	1.5e-04	4.8e-06	1.6e-08	6.1e-08	1.7e-05	2.9e-05
Sb-124	1.8e-03	9.5e-07	3.7e-06	7.8e-03	1.2e-02	3.6e-04	1.9e-07	7.4e-07	1.5e-03	2.3e-03
Sb-125	1.2e-03	6.5e-07	2.5e-06	5.3e-03	7.9e-03	2.4e-04	1.3e-07	4.9e-07	1.0e-03	1.6e-03
Te-123m	1.3e-03	1.1e-05	3.1e-05	5.1e-03	8.2e-03	2.6e-04	2.3e-06	6.2e-06	1.0e-03	1.6e-03
Te-127m	2.0e-03	1.7e-05	4.8e-05	7.8e-03	1.2e-02	3.9e-04	3.4e-06	9.4e-06	1.5e-03	2.4e-03
I-125	7.1e-01	2.0e-01	6.0e-01	1.3e+00	1.6e+00	1.4e-01	4.0e-02	1.2e-01	2.5e-01	3.0e-01
I-129	9.6e+00	2.8e+00	8.3e+00	1.7e+01	2.1e+01	1.9e+00	5.7e-01	1.6e+00	3.4e+00	4.0e+00
I-131	4.3e-02	2.8e-03	2.3e-02	1.1e-01	1.5e-01	8.4e-03	5.5e-04	4.5e-03	2.1e-02	2.9e-02
Cs-134	7.3e-02	4.5e-04	1.5e-03	2.8e-01	4.6e-01	1.4e-02	9.1e-05	2.9e-04	5.5e-02	9.2e-02
Cs-135	7.6e-03	4.6e-05	1.5e-04	2.9e-02	4.8e-02	1.5e-03	9.4e-06	3.0e-05	5.7e-03	9.5e-03
Cs-137	5.3e-02	3.3e-04	1.1e-03	2.0e-01	3.4e-01	1.1e-02	6.6e-05	2.1e-04	4.0e-02	6.7e-02
Ba-133	5.9e-05	3.3e-07	9.5e-07	2.4e-04	3.8e-04	1.2e-05	6.6e-08	1.8e-07	4.8e-05	7.6e-05
Ce-139	1.4e-05	7.7e-08	2.3e-07	5.7e-05	9.0e-05	2.8e-06	1.6e-08	4.4e-08	1.1e-05	1.8e-05
Ce-141	1.5e-05	7.1e-08	2.5e-07	5.8e-05	9.5e-05	3.0e-06	1.5e-08	4.9e-08	1.1e-05	1.9e-05
Ce-144	3.0e-04	1.7e-06	4.8e-06	1.2e-03	1.9e-03	5.9e-05	3.4e-07	9.5e-07	2.4e-04	3.8e-04
Pm-147	1.9e-05	1.0e-07	3.0e-07	7.8e-05	1.2e-04	3.8e-06	2.0e-08	5.9e-08	1.5e-05	2.4e-05

Table F1.29 Normalized effective dose equivalents from ingestion: Airborne emissions

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	7.4e-06	4.0e-08	1.2e-07	2.9e-05	4.7e-05	1.5e-06	7.9e-09	2.3e-08	5.8e-06	9.3e-06
Eu-152	1.2e-04	6.5e-07	1.9e-06	4.9e-04	7.7e-04	2.4e-05	1.3e-07	3.7e-07	9.8e-05	1.5e-04
Eu-154	1.8e-04	9.6e-07	2.8e-06	7.3e-04	1.1e-03	3.5e-05	1.9e-07	5.5e-07	1.4e-04	2.3e-04
Eu-155	2.8e-05	1.5e-07	4.4e-07	1.1e-04	1.8e-04	5.5e-06	3.1e-08	8.7e-08	2.3e-05	3.6e-05
Gd-153	1.9e-05	1.0e-07	3.0e-07	7.7e-05	1.2e-04	3.7e-06	2.0e-08	5.8e-08	1.5e-05	2.3e-05
Tb-160	7.3e-05	3.8e-07	1.2e-06	3.0e-04	4.6e-04	1.4e-05	7.7e-08	2.3e-07	5.8e-05	9.1e-05
Tm-170	7.2e-05	3.9e-07	1.1e-06	3.0e-04	4.5e-04	1.4e-05	7.8e-08	2.2e-07	5.9e-05	9.1e-05
Tm-171	7.6e-06	4.1e-08	1.2e-07	3.2e-05	4.8e-05	1.5e-06	8.3e-09	2.3e-08	6.3e-06	9.6e-06
Ta-182	7.6e-05	4.1e-07	1.2e-06	3.1e-04	4.8e-04	1.5e-05	8.1e-08	2.4e-07	6.2e-05	9.5e-05
W-181	2.6e-06	1.3e-08	6.2e-08	6.7e-06	1.5e-05	5.1e-07	2.5e-09	1.2e-08	1.3e-06	2.9e-06
W-185	1.0e-05	5.2e-08	2.5e-07	2.8e-05	6.0e-05	2.1e-06	1.0e-08	5.0e-08	5.5e-06	1.2e-05
Os-185	5.5e-04	3.2e-06	8.5e-06	2.3e-03	3.5e-03	1.1e-04	6.6e-07	1.7e-06	4.6e-04	7.0e-04
Ir-192	1.0e-05	8.0e-08	2.6e-07	3.5e-05	6.7e-05	2.0e-06	1.6e-08	5.2e-08	7.0e-06	1.3e-05
Tl-204	3.6e-03	1.5e-05	5.7e-05	1.2e-02	2.1e-02	7.1e-04	2.9e-06	1.1e-05	2.4e-03	4.1e-03
Pb-210	2.5e+00	1.6e-02	3.9e-02	1.1e+01	1.6e+01	4.9e-01	3.1e-03	7.5e-03	2.1e+00	3.2e+00
Bi-207	2.7e-03	1.5e-05	4.2e-05	1.1e-02	1.7e-02	5.3e-04	3.0e-06	8.1e-06	2.2e-03	3.3e-03
Po-210	5.2e-01	3.5e-03	9.1e-03	2.6e+00	3.9e+00	1.2e-01	7.2e-04	1.8e-03	5.1e-01	7.7e-01
Ra-226	2.6e-02	1.5e-04	4.2e-04	1.1e-01	1.7e-01	5.2e-03	2.9e-05	8.1e-05	2.1e-02	3.3e-02
Ra-228	2.8e-02	1.5e-04	4.4e-04	1.2e-01	1.8e-01	5.5e-03	3.1e-05	8.6e-05	2.3e-02	3.5e-02
Ac-227	2.4e-01	1.3e-03	3.8e-03	1.0e+00	1.6e+00	4.8e-02	2.6e-04	7.5e-04	2.0e-01	3.0e-01
Th-228	1.3e-02	7.0e-05	2.0e-04	5.3e-02	8.1e-02	2.5e-03	1.4e-05	3.9e-05	1.0e-02	1.6e-02
Th-229	6.7e-02	3.7e-04	1.0e-03	2.8e-01	4.3e-01	1.3e-02	7.4e-05	2.1e-04	5.5e-02	8.5e-02
Th-230	9.1e-03	5.0e-05	1.4e-04	3.8e-02	5.9e-02	1.8e-03	1.0e-05	2.8e-05	7.5e-03	1.2e-02
Th-232	4.6e-02	2.5e-04	7.1e-04	1.9e-01	2.9e-01	9.0e-03	5.0e-05	1.4e-04	3.7e-02	5.8e-02
Pa-231	1.8e-01	9.7e-04	2.8e-03	7.4e-01	1.2e+00	3.5e-02	2.0e-04	5.6e-04	1.4e-01	2.3e-01
U-232	2.3e-02	1.3e-04	3.7e-04	9.6e-02	1.5e-01	4.6e-03	2.6e-05	7.2e-05	1.9e-02	3.0e-02
U-233	5.1e-03	2.9e-05	8.1e-05	2.1e-02	3.3e-02	1.0e-03	5.7e-06	1.6e-05	4.3e-03	6.6e-03
U-234	5.0e-03	2.8e-05	8.0e-05	2.1e-02	3.3e-02	9.9e-04	5.6e-06	1.6e-05	4.2e-03	6.5e-03
U-235	4.8e-03	2.6e-05	7.5e-05	2.0e-02	3.1e-02	9.4e-04	5.3e-06	1.5e-05	4.0e-03	6.1e-03
U-236	4.8e-03	2.7e-05	7.5e-05	2.0e-02	3.1e-02	9.4e-04	5.3e-06	1.5e-05	4.0e-03	6.1e-03
U-238	4.8e-03	2.6e-05	7.5e-05	2.0e-02	3.1e-02	9.4e-04	5.3e-06	1.5e-05	4.0e-03	6.1e-03
Np-237	8.1e-02	4.4e-04	1.3e-03	3.3e-01	5.2e-01	1.6e-02	8.9e-05	2.5e-04	6.7e-02	1.0e-01
Pu-236	1.9e-02	1.0e-04	2.9e-04	7.6e-02	1.2e-01	3.7e-03	2.0e-05	5.7e-05	1.5e-02	2.3e-02
Pu-238	5.3e-02	2.9e-04	8.4e-04	2.2e-01	3.4e-01	1.0e-02	5.8e-05	1.6e-04	4.3e-02	6.7e-02
Pu-239	5.8e-02	3.2e-04	9.3e-04	2.4e-01	3.8e-01	1.2e-02	6.4e-05	1.8e-04	4.8e-02	7.4e-02
Pu-240	5.8e-02	3.2e-04	9.3e-04	2.4e-01	3.8e-01	1.2e-02	6.4e-05	1.8e-04	4.8e-02	7.4e-02
Pu-241	1.1e-03	6.1e-06	1.8e-05	4.6e-03	7.2e-03	2.2e-04	1.2e-06	3.5e-06	9.2e-04	1.4e-03
Pu-242	5.6e-02	3.0e-04	8.8e-04	2.3e-01	3.6e-01	1.1e-02	6.1e-05	1.7e-04	4.6e-02	7.0e-02
Pu-244	5.5e-02	3.0e-04	8.7e-04	2.2e-01	3.5e-01	1.1e-02	6.0e-05	1.7e-04	4.5e-02	6.9e-02
Am-241	6.0e-02	3.3e-04	9.5e-04	2.5e-01	3.8e-01	1.2e-02	6.6e-05	1.9e-04	4.9e-02	7.6e-02
Am-242m	5.9e-02	3.3e-04	9.4e-04	2.5e-01	3.8e-01	1.2e-02	6.6e-05	1.8e-04	4.9e-02	7.5e-02
Am-243	6.0e-02	3.3e-04	9.4e-04	2.5e-01	3.8e-01	1.2e-02	6.6e-05	1.9e-04	4.9e-02	7.6e-02
Cm-242	1.5e-03	8.1e-06	2.3e-05	6.0e-03	9.6e-03	2.9e-04	1.6e-06	4.6e-06	1.2e-03	1.9e-03
Cm-243	4.1e-02	2.3e-04	6.5e-04	1.7e-01	2.7e-01	8.2e-03	4.6e-05	1.3e-04	3.3e-02	5.3e-02
Cm-244	3.3e-02	1.8e-04	5.2e-04	1.4e-01	2.2e-01	6.5e-03	3.7e-05	1.0e-04	2.7e-02	4.3e-02
Cm-245	6.2e-02	3.4e-04	9.7e-04	2.5e-01	4.0e-01	1.2e-02	6.8e-05	1.9e-04	5.0e-02	8.0e-02
Cm-246	6.1e-02	3.4e-04	9.6e-04	2.5e-01	4.0e-01	1.2e-02	6.7e-05	1.9e-04	4.9e-02	7.9e-02
Cm-247	5.7e-02	3.1e-04	8.9e-04	2.3e-01	3.7e-01	1.1e-02	6.2e-05	1.7e-04	4.6e-02	7.3e-02
Cm-248	2.3e-01	1.2e-03	3.5e-03	9.2e-01	1.5e+00	4.4e-02	2.5e-04	6.9e-04	1.8e-01	2.9e-01
Bk-249	1.8e-04	9.5e-07	2.8e-06	7.1e-04	1.1e-03	3.5e-05	1.9e-07	5.4e-07	1.4e-04	2.2e-04
Cf-248	5.0e-03	2.6e-05	7.7e-05	2.1e-02	3.2e-02	9.8e-04	5.4e-06	1.5e-05	4.1e-03	6.2e-03
Cf-249	7.9e-02	4.3e-04	1.2e-03	3.3e-01	5.1e-01	1.6e-02	8.6e-05	2.4e-04	6.5e-02	1.0e-01
Cf-250	3.5e-02	1.9e-04	5.5e-04	1.5e-01	2.3e-01	7.0e-03	3.8e-05	1.1e-04	2.9e-02	4.5e-02
Cf-251	8.1e-02	4.4e-04	1.3e-03	3.4e-01	5.3e-01	1.6e-02	8.8e-05	2.5e-04	6.7e-02	1.0e-01
Cf-252	1.7e-02	9.3e-05	2.7e-04	7.2e-02	1.1e-01	3.4e-03	1.9e-05	5.3e-05	1.4e-02	2.2e-02
Cf-254	2.1e-02	1.1e-04	3.4e-04	8.7e-02	1.3e-01	4.2e-03	2.2e-05	6.6e-05	1.7e-02	2.7e-02
Es-254	4.4e-03	2.4e-05	7.1e-05	1.8e-02	2.9e-02	8.7e-04	4.9e-06	1.4e-05	3.6e-03	5.6e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.30 Normalized effective dose equivalents from all pathways: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.7e+00	3.3e+00	5.5e+00	7.9e+00	8.7e+00	1.1e+00	6.6e-01	1.1e+00	1.5e+00	1.7e+00
P-32	3.1e-07	7.8e-08	2.5e-07	6.1e-07	7.2e-07	6.0e-08	1.6e-08	5.0e-08	1.2e-07	1.4e-07
S-35	2.3e-05	1.2e-05	2.2e-05	3.4e-05	3.8e-05	4.5e-06	2.3e-06	4.3e-06	6.6e-06	7.3e-06
Cl-36	8.1e-04	2.2e-04	7.5e-04	1.4e-03	1.6e-03	1.6e-04	4.4e-05	1.5e-04	2.8e-04	3.2e-04
K-40	5.1e-01	2.9e-01	5.0e-01	7.1e-01	7.8e-01	1.0e-01	5.9e-02	9.8e-02	1.4e-01	1.5e-01
Ca-41	1.8e-04	5.2e-05	1.8e-04	3.1e-04	3.4e-04	3.6e-05	1.1e-05	3.5e-05	6.0e-05	6.6e-05
Ca-45	2.5e-04	1.0e-04	2.4e-04	3.8e-04	4.2e-04	4.9e-05	2.1e-05	4.7e-05	7.5e-05	8.2e-05
Sc-46	2.0e+00	1.1e+00	1.9e+00	2.8e+00	3.0e+00	3.9e-01	2.3e-01	3.8e-01	5.4e-01	5.9e-01
Cr-51	2.6e-04	6.0e-05	2.2e-04	4.8e-04	5.8e-04	5.1e-05	1.2e-05	4.4e-05	9.3e-05	1.1e-04
Mn-53	2.5e-05	1.2e-05	2.4e-05	3.8e-05	4.2e-05	5.0e-06	2.4e-06	4.9e-06	7.4e-06	8.2e-06
Mn-54	2.7e+00	1.6e+00	2.6e+00	3.7e+00	4.1e+00	5.3e-01	3.2e-01	5.2e-01	7.2e-01	7.8e-01
Fe-55	2.5e-06	7.7e-07	2.2e-06	4.3e-06	5.0e-06	4.9e-07	1.5e-07	4.4e-07	8.4e-07	9.7e-07
Fe-59	6.5e-03	2.6e-03	5.9e-03	1.1e-02	1.2e-02	1.3e-03	5.3e-04	1.2e-03	2.1e-03	2.4e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.8e-01	1.5e-01	2.7e-01	3.9e-01	4.3e-01	5.4e-02	3.1e-02	5.2e-02	7.6e-02	8.4e-02
Sr-89	5.0e-04	2.7e-04	4.8e-04	7.2e-04	8.1e-04	9.9e-05	5.6e-05	9.5e-05	1.4e-04	1.6e-04
Sr-90	4.7e-02	2.6e-02	4.6e-02	6.7e-02	7.3e-02	9.3e-03	5.2e-03	9.0e-03	1.3e-02	1.4e-02
Y-91	2.6e-03	1.4e-03	2.5e-03	3.6e-03	4.0e-03	5.0e-04	2.9e-04	4.9e-04	7.1e-04	7.8e-04
Zr-93	2.9e-03	1.4e-03	2.8e-03	4.4e-03	5.0e-03	5.7e-04	2.9e-04	5.4e-04	8.4e-04	9.6e-04
Zr-95	1.2e+00	6.7e-01	1.2e+00	1.7e+00	1.9e+00	2.4e-01	1.4e-01	2.3e-01	3.3e-01	3.6e-01
Nb-93m	1.1e-03	5.6e-04	1.0e-03	1.6e-03	1.8e-03	2.1e-04	1.1e-04	2.0e-04	3.1e-04	3.5e-04
Nb-94	9.0e+00	5.2e+00	8.8e+00	1.2e+01	1.3e+01	1.8e+00	1.1e+00	1.7e+00	2.4e+00	2.6e+00
Nb-95	6.2e-02	3.0e-02	5.8e-02	9.4e-02	1.1e-01	1.2e-02	6.1e-03	1.1e-02	1.8e-02	2.1e-02
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.7e-02	8.0e-03	2.4e-02	4.7e-02	5.6e-02	5.3e-03	1.6e-03	4.8e-03	9.2e-03	1.1e-02
Sb-125	5.8e-02	1.8e-02	5.3e-02	1.0e-01	1.2e-01	1.2e-02	3.6e-03	1.0e-02	2.0e-02	2.3e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.2e-04	1.1e-04	3.8e-04	7.6e-04	8.9e-04	8.3e-05	2.1e-05	7.5e-05	1.5e-04	1.8e-04
I-129	1.2e-02	2.5e-03	1.0e-02	2.3e-02	2.7e-02	2.3e-03	5.0e-04	2.0e-03	4.5e-03	5.3e-03
I-131	6.7e-09	3.9e-10	3.4e-09	1.8e-08	2.5e-08	1.3e-09	7.7e-11	6.7e-10	3.5e-09	4.9e-09
Cs-134	1.8e-01	5.5e-02	1.6e-01	3.1e-01	3.7e-01	3.5e-02	1.1e-02	3.2e-02	6.2e-02	7.2e-02
Cs-135	2.4e-05	4.3e-06	1.9e-05	4.8e-05	5.8e-05	4.7e-06	8.6e-07	3.9e-06	9.4e-06	1.1e-05
Cs-137	7.8e-02	2.4e-02	7.0e-02	1.4e-01	1.6e-01	1.5e-02	4.7e-03	1.4e-02	2.7e-02	3.1e-02
Ba-133	1.8e+00	1.0e+00	1.7e+00	2.4e+00	2.6e+00	3.5e-01	2.1e-01	3.4e-01	4.7e-01	5.1e-01
Ce-139	2.0e-01	1.2e-01	1.9e-01	2.8e-01	3.0e-01	3.9e-02	2.4e-02	3.8e-02	5.4e-02	5.8e-02
Ce-141	3.0e-03	1.4e-03	2.8e-03	4.7e-03	5.3e-03	6.0e-04	2.9e-04	5.6e-04	9.2e-04	1.0e-03
Ce-144	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.8e-01	3.6e-02	2.2e-02	3.6e-02	4.9e-02	5.3e-02
Pm-147	1.2e-03	6.3e-04	1.2e-03	1.8e-03	2.1e-03	2.4e-04	1.3e-04	2.3e-04	3.5e-04	4.0e-04

Table F1.30 Normalized effective dose equivalents from all pathways: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-03	5.0e-04	9.6e-04	1.5e-03	1.7e-03	2.0e-04	1.0e-04	1.9e-04	2.9e-04	3.3e-04
Eu-152	6.3e+00	3.7e+00	6.2e+00	8.7e+00	9.4e+00	1.2e+00	7.6e-01	1.2e+00	1.7e+00	1.8e+00
Eu-154	6.8e+00	4.0e+00	6.7e+00	9.4e+00	1.0e+01	1.3e+00	8.2e-01	1.3e+00	1.8e+00	2.0e+00
Eu-155	1.6e-01	9.2e-02	1.5e-01	2.2e-01	2.3e-01	3.1e-02	1.9e-02	3.0e-02	4.2e-02	4.5e-02
Gd-153	1.2e-01	7.2e-02	1.2e-01	1.7e-01	1.8e-01	2.4e-02	1.5e-02	2.4e-02	3.3e-02	3.5e-02
Tb-160	8.1e-01	4.5e-01	7.9e-01	1.1e+00	1.3e+00	1.6e-01	9.3e-02	1.5e-01	2.2e-01	2.5e-01
Tm-170	4.8e-03	2.9e-03	4.7e-03	6.8e-03	7.1e-03	9.4e-04	5.8e-04	9.2e-04	1.3e-03	1.4e-03
Tm-171	1.1e-03	6.8e-04	1.1e-03	1.5e-03	1.6e-03	2.2e-04	1.4e-04	2.2e-04	2.9e-04	3.1e-04
Ta-182	2.0e+00	1.2e+00	2.0e+00	2.8e+00	3.1e+00	4.0e-01	2.4e-01	3.9e-01	5.4e-01	5.9e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.1e+01	6.4e+00	1.1e+01	1.5e+01	1.6e+01	2.1e+00	1.3e+00	2.1e+00	2.9e+00	3.1e+00
Ra-228	9.3e+00	5.7e+00	9.2e+00	1.3e+01	1.4e+01	1.8e+00	1.2e+00	1.8e+00	2.4e+00	2.6e+00
Ac-227	4.5e+01	2.3e+01	4.3e+01	6.7e+01	7.7e+01	8.9e+00	4.7e+00	8.5e+00	1.3e+01	1.5e+01
Th-228	1.7e+01	9.9e+00	1.6e+01	2.3e+01	2.5e+01	3.3e+00	2.0e+00	3.2e+00	4.4e+00	4.9e+00
Th-229	5.9e+01	2.9e+01	5.6e+01	8.8e+01	1.0e+02	1.2e+01	5.9e+00	1.1e+01	1.7e+01	1.9e+01
Th-230	8.6e+00	4.1e+00	8.1e+00	1.3e+01	1.5e+01	1.7e+00	8.4e-01	1.6e+00	2.5e+00	2.9e+00
Th-232	3.8e+01	1.9e+01	3.6e+01	5.8e+01	6.6e+01	7.5e+00	3.8e+00	7.1e+00	1.1e+01	1.3e+01
Pa-231	3.0e+01	1.5e+01	2.9e+01	4.5e+01	5.1e+01	5.9e+00	3.0e+00	5.6e+00	8.7e+00	9.9e+00
U-232	2.5e+01	1.3e+01	2.4e+01	3.8e+01	4.3e+01	5.0e+00	2.6e+00	4.7e+00	7.3e+00	8.3e+00
U-233	4.4e+00	2.1e+00	4.2e+00	6.7e+00	7.6e+00	8.7e-01	4.3e-01	8.2e-01	1.3e+00	1.5e+00
U-234	4.3e+00	2.1e+00	4.1e+00	6.5e+00	7.5e+00	8.5e-01	4.2e-01	8.0e-01	1.3e+00	1.4e+00
U-235	4.7e+00	2.5e+00	4.5e+00	6.9e+00	7.8e+00	9.3e-01	5.0e-01	8.8e-01	1.3e+00	1.5e+00
U-236	4.1e+00	2.0e+00	3.9e+00	6.2e+00	7.1e+00	8.0e-01	4.0e-01	7.6e-01	1.2e+00	1.4e+00
U-238	4.0e+00	2.0e+00	3.8e+00	6.0e+00	6.8e+00	7.8e-01	4.0e-01	7.4e-01	1.2e+00	1.3e+00
Np-237	1.9e+01	9.6e+00	1.8e+01	2.8e+01	3.2e+01	3.8e+00	2.0e+00	3.6e+00	5.5e+00	6.2e+00
Pu-236	3.9e+00	1.9e+00	3.7e+00	5.8e+00	6.7e+00	7.7e-01	3.9e-01	7.2e-01	1.1e+00	1.3e+00
Pu-238	9.7e+00	4.7e+00	9.2e+00	1.5e+01	1.7e+01	1.9e+00	9.6e-01	1.8e+00	2.8e+00	3.2e+00
Pu-239	1.0e+01	5.1e+00	9.9e+00	1.6e+01	1.8e+01	2.1e+00	1.0e+00	1.9e+00	3.0e+00	3.4e+00
Pu-240	1.0e+01	5.1e+00	9.9e+00	1.6e+01	1.8e+01	2.1e+00	1.0e+00	1.9e+00	3.0e+00	3.4e+00
Pu-241	1.8e-01	8.7e-02	1.7e-01	2.7e-01	3.0e-01	3.5e-02	1.8e-02	3.3e-02	5.2e-02	5.9e-02
Pu-242	9.9e+00	4.9e+00	9.4e+00	1.5e+01	1.7e+01	2.0e+00	9.9e-01	1.8e+00	2.9e+00	3.3e+00
Pu-244	1.2e+01	6.3e+00	1.1e+01	1.7e+01	1.9e+01	2.3e+00	1.3e+00	2.2e+00	3.3e+00	3.7e+00
Am-241	1.5e+01	7.3e+00	1.4e+01	2.2e+01	2.6e+01	2.9e+00	1.5e+00	2.8e+00	4.3e+00	4.9e+00
Am-242m	1.5e+01	7.2e+00	1.4e+01	2.2e+01	2.5e+01	2.9e+00	1.5e+00	2.8e+00	4.3e+00	4.9e+00
Am-243	1.6e+01	7.9e+00	1.5e+01	2.3e+01	2.6e+01	3.1e+00	1.6e+00	2.9e+00	4.5e+00	5.1e+00
Cm-242	2.6e-01	1.3e-01	2.4e-01	3.9e-01	4.5e-01	5.1e-02	2.6e-02	4.8e-02	7.6e-02	8.7e-02
Cm-243	1.1e+01	5.4e+00	1.0e+01	1.6e+01	1.8e+01	2.1e+00	1.1e+00	2.0e+00	3.1e+00	3.5e+00
Cm-244	8.1e+00	3.9e+00	7.6e+00	1.2e+01	1.4e+01	1.6e+00	8.0e-01	1.5e+00	2.4e+00	2.7e+00
Cm-245	1.6e+01	7.7e+00	1.5e+01	2.3e+01	2.6e+01	3.1e+00	1.6e+00	2.9e+00	4.5e+00	5.1e+00
Cm-246	1.5e+01	7.4e+00	1.4e+01	2.3e+01	2.6e+01	3.0e+00	1.5e+00	2.8e+00	4.4e+00	5.0e+00
Cm-247	1.6e+01	8.1e+00	1.5e+01	2.3e+01	2.6e+01	3.1e+00	1.7e+00	2.9e+00	4.4e+00	5.0e+00
Cm-248	5.5e+01	2.7e+01	5.2e+01	8.3e+01	9.5e+01	1.1e+01	5.5e+00	1.0e+01	1.6e+01	1.8e+01
Bk-249	4.3e-02	2.1e-02	4.0e-02	6.4e-02	7.2e-02	8.4e-03	4.4e-03	8.0e-03	1.2e-02	1.4e-02
Cf-248	1.2e+00	6.0e-01	1.2e+00	1.8e+00	2.1e+00	2.4e-01	1.2e-01	2.3e-01	3.6e-01	4.1e-01
Cf-249	1.5e+01	7.7e+00	1.4e+01	2.3e+01	2.4e+01	2.9e+00	1.6e+00	2.7e+00	4.1e+00	4.7e+00
Cf-250	6.7e+00	3.3e+00	6.4e+00	1.0e+01	1.2e+01	1.3e+00	6.7e-01	1.3e+00	2.0e+00	2.2e+00
Cf-251	1.4e+01	6.9e+00	1.3e+01	2.0e+01	2.3e+01	2.7e+00	1.4e+00	2.5e+00	3.9e+00	4.5e+00
Cf-252	4.5e+00	2.2e+00	4.2e+00	6.7e+00	7.7e+00	8.8e-01	4.4e-01	8.3e-01	1.3e+00	1.5e+00
Cf-254	8.3e-01	3.9e-01	7.7e-01	1.3e+00	1.5e+00	1.6e-01	7.9e-02	1.5e-01	2.5e-01	2.9e-01
Es-254	4.0e+00	2.4e+00	3.9e+00	5.3e+00	5.8e+00	7.8e-01	4.9e-01	7.7e-01	1.0e+00	1.1e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.31 Normalized effective dose equivalents from external exposure: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.7e+00	3.3e+00	5.5e+00	7.9e+00	8.7e+00	1.1e+00	6.6e-01	1.1e+00	1.5e+00	1.7e+00
P-32	2.8e-07	7.0e-08	2.3e-07	5.5e-07	6.5e-07	5.5e-08	1.4e-08	4.5e-08	1.1e-07	1.3e-07
S-35	2.2e-06	1.3e-06	2.2e-06	3.1e-06	3.4e-06	4.4e-07	2.5e-07	4.2e-07	6.0e-07	6.6e-07
Cl-36	5.5e-04	1.5e-04	5.1e-04	9.7e-04	1.1e-03	1.1e-04	2.9e-05	1.0e-04	1.9e-04	2.2e-04
K-40	5.1e-01	2.9e-01	5.0e-01	7.1e-01	7.8e-01	1.0e-01	5.9e-02	9.8e-02	1.4e-01	1.5e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.3e-05	1.3e-05	2.3e-05	3.2e-05	3.5e-05	4.6e-06	2.8e-06	4.5e-06	6.2e-06	6.8e-06
Sc-46	2.0e+00	1.1e+00	1.9e+00	2.8e+00	3.0e+00	3.9e-01	2.3e-01	3.8e-01	5.4e-01	5.9e-01
Cr-51	2.6e-04	8.0e-05	2.2e-04	4.8e-04	5.8e-04	5.1e-05	1.2e-05	4.4e-05	9.3e-05	1.1e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.7e+00	1.6e+00	2.6e+00	3.7e+00	4.0e+00	5.3e-01	3.2e-01	5.2e-01	7.2e-01	7.8e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	8.5e-03	2.6e-03	5.9e-03	1.1e-02	1.2e-02	1.3e-03	5.3e-04	1.2e-03	2.1e-03	2.4e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.8e-01	1.5e-01	2.7e-01	3.9e-01	4.3e-01	5.4e-02	3.1e-02	5.2e-02	7.6e-02	8.4e-02
Sr-89	4.4e-04	2.3e-04	4.2e-04	6.4e-04	7.1e-04	8.6e-05	4.7e-05	8.3e-05	1.2e-04	1.4e-04
Sr-90	2.3e-02	1.3e-02	2.2e-02	3.1e-02	3.4e-02	4.4e-03	2.7e-03	4.4e-03	6.0e-03	6.5e-03
Y-91	2.3e-03	1.3e-03	2.3e-03	3.4e-03	3.7e-03	4.6e-04	2.6e-04	4.5e-04	6.5e-04	7.2e-04
Zr-93	2.3e-06	1.3e-06	2.3e-06	3.2e-06	3.5e-06	4.6e-07	2.7e-07	4.5e-07	6.2e-07	6.7e-07
Zr-95	1.2e+00	6.7e-01	1.2e+00	1.7e+00	1.9e+00	2.4e-01	1.4e-01	2.3e-01	3.3e-01	3.6e-01
Nb-93m	9.4e-05	5.5e-05	9.2e-05	1.3e-04	1.4e-04	1.9e-05	1.1e-05	1.8e-05	2.5e-05	2.7e-05
Nb-94	9.0e+00	5.2e+00	8.8e+00	1.2e+01	1.3e+01	1.8e+00	1.1e+00	1.7e+00	2.4e+00	2.6e+00
Nb-95	6.2e-02	3.0e-02	5.8e-02	9.4e-02	1.1e-01	1.2e-02	6.1e-03	1.1e-02	1.8e-02	2.1e-02
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.7e-02	8.0e-03	2.4e-02	4.7e-02	5.6e-02	5.3e-03	1.6e-03	4.8e-03	9.2e-03	1.1e-02
Sb-125	5.8e-02	1.8e-02	5.3e-02	1.0e-01	1.2e-01	1.2e-02	3.6e-03	1.0e-02	2.0e-02	2.3e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.2e-04	8.1e-05	2.9e-04	5.7e-04	6.8e-04	6.3e-05	1.6e-05	5.6e-05	1.1e-04	1.3e-04
I-129	3.0e-03	7.8e-04	2.7e-03	5.3e-03	6.1e-03	5.9e-04	1.6e-04	5.4e-04	1.0e-03	1.2e-03
I-131	6.7e-09	3.9e-10	3.4e-09	7.8e-08	2.5e-08	1.3e-09	7.7e-11	6.7e-10	3.5e-09	4.8e-09
Cs-134	1.8e-01	5.5e-02	1.6e-01	3.1e-01	3.7e-01	3.5e-02	1.1e-02	3.2e-02	6.1e-02	7.2e-02
Cs-135	8.9e-07	2.7e-07	8.0e-07	1.6e-06	1.8e-06	1.7e-07	5.4e-08	1.6e-07	3.0e-07	3.5e-07
Cs-137	7.8e-02	2.4e-02	7.0e-02	1.4e-01	1.6e-01	1.5e-02	4.7e-03	1.4e-02	2.7e-02	3.1e-02
Ba-133	1.8e+00	1.0e+00	1.7e+00	2.4e+00	2.6e+00	3.5e-01	2.1e-01	3.4e-01	4.7e-01	5.1e-01
Ce-139	2.0e-01	1.2e-01	1.9e-01	2.6e-01	3.0e-01	3.9e-02	2.4e-02	3.8e-02	5.3e-02	5.8e-02
Ce-141	3.0e-03	1.4e-03	2.8e-03	4.7e-03	5.3e-03	6.0e-04	2.9e-04	5.6e-04	9.2e-04	1.0e-03
Ce-144	1.8e-01	1.0e-01	1.7e-01	2.4e-01	2.6e-01	3.5e-02	2.1e-02	3.4e-02	4.7e-02	5.1e-02
Pm-147	4.0e-05	2.3e-05	3.9e-05	5.5e-05	6.0e-05	7.8e-06	4.8e-06	7.7e-06	1.1e-05	1.1e-05

Table F1.31 Normalized effective dose equivalents from external exposure: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	9.1e-07	5.3e-07	8.9e-07	1.3e-06	1.4e-06	1.8e-07	1.1e-07	1.8e-07	2.4e-07	2.6e-07
Eu-152	6.3e+00	3.7e+00	6.2e+00	8.7e+00	9.4e+00	1.2e+00	7.6e-01	1.2e+00	1.7e+00	1.8e+00
Eu-154	6.8e+00	4.0e+00	6.7e+00	9.4e+00	1.0e+01	1.3e+00	8.1e-01	1.3e+00	1.8e+00	2.0e+00
Eu-155	1.6e-01	9.1e-02	1.5e-01	2.2e-01	2.3e-01	3.1e-02	1.9e-02	3.0e-02	4.2e-02	4.5e-02
Gd-153	1.2e-01	7.1e-02	1.2e-01	1.7e-01	1.8e-01	2.4e-02	1.5e-02	2.4e-02	3.3e-02	3.5e-02
Tb-160	8.1e-01	4.5e-01	7.9e-01	1.1e+00	1.3e+00	1.6e-01	9.3e-02	1.5e-01	2.2e-01	2.5e-01
Tm-170	4.5e-03	2.5e-03	4.2e-03	6.0e-03	6.6e-03	8.5e-04	5.1e-04	8.4e-04	1.2e-03	1.3e-03
Tm-171	8.4e-04	4.9e-04	8.2e-04	1.2e-03	1.3e-03	1.7e-04	1.0e-04	1.6e-04	2.2e-04	2.4e-04
Ta-182	2.0e+00	1.2e+00	2.0e+00	2.8e+00	3.1e+00	4.0e-01	2.4e-01	3.9e-01	5.4e-01	5.9e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.0e+01	6.0e+00	1.0e+01	1.4e+01	1.5e+01	2.0e+00	1.2e+00	2.0e+00	2.8e+00	3.0e+00
Ra-228	6.9e+00	4.0e+00	6.8e+00	9.6e+00	1.0e+01	1.4e+00	8.3e-01	1.3e+00	1.9e+00	2.0e+00
Ac-227	1.8e+00	1.1e+00	1.8e+00	2.5e+00	2.7e+00	3.6e-01	2.2e-01	3.6e-01	4.9e-01	5.3e-01
Th-228	7.6e+00	4.5e+00	7.5e+00	1.1e+01	1.1e+01	1.5e+00	9.1e-01	1.5e+00	2.0e+00	2.2e+00
Th-229	1.5e+00	8.6e-01	1.4e+00	2.0e+00	2.2e+00	2.9e-01	1.8e-01	2.9e-01	3.9e-01	4.3e-01
Th-230	3.8e-03	2.2e-03	3.7e-03	5.3e-03	5.7e-03	7.5e-04	4.5e-04	7.3e-04	1.0e-03	1.1e-03
Th-232	4.5e-01	2.6e-01	4.4e-01	6.3e-01	6.8e-01	8.9e-02	5.3e-02	8.7e-02	1.2e-01	1.3e-01
Pa-231	2.1e-01	1.2e-01	2.1e-01	2.9e-01	3.2e-01	4.2e-02	2.5e-02	4.1e-02	5.7e-02	6.1e-02
U-232	1.8e+00	1.0e+00	1.8e+00	2.5e+00	2.7e+00	3.6e-01	2.2e-01	3.5e-01	4.9e-01	5.3e-01
U-233	1.3e-03	8.1e-04	1.4e-03	1.9e-03	2.1e-03	2.7e-04	1.7e-04	2.7e-04	3.7e-04	4.0e-04
U-234	3.7e-04	2.2e-04	3.6e-04	5.2e-04	5.6e-04	7.4e-05	4.5e-05	7.2e-05	1.0e-04	1.1e-04
U-235	7.0e-01	4.1e-01	6.9e-01	9.7e-01	1.1e+00	1.4e-01	8.4e-02	1.4e-01	1.9e-01	2.0e-01
U-236	2.0e-04	1.2e-04	2.0e-04	2.8e-04	3.0e-04	3.9e-05	2.4e-05	3.9e-05	5.3e-05	5.7e-05
U-238	1.2e-01	7.2e-02	1.2e-01	1.7e-01	1.8e-01	2.4e-02	1.5e-02	2.4e-02	3.3e-02	3.5e-02
Np-237	1.0e+00	5.9e-01	1.0e+00	1.4e+00	1.5e+00	2.0e-01	1.2e-01	2.0e-01	2.7e-01	2.9e-01
Pu-236	5.6e-03	3.1e-03	5.4e-03	7.9e-03	8.6e-03	1.1e-03	6.4e-04	1.1e-03	1.5e-03	1.7e-03
Pu-238	1.4e-04	8.1e-05	1.4e-04	1.9e-04	2.1e-04	2.8e-05	1.7e-05	2.7e-05	3.7e-05	4.0e-05
Pu-239	2.7e-04	1.6e-04	2.7e-04	3.8e-04	4.1e-04	5.4e-05	3.3e-05	5.3e-05	7.3e-05	7.9e-05
Pu-240	1.4e-04	7.9e-05	1.3e-04	1.9e-04	2.0e-04	2.7e-05	1.6e-05	2.6e-05	3.6e-05	3.9e-05
Pu-241	4.3e-05	2.5e-05	4.2e-05	6.0e-05	6.5e-05	8.6e-06	5.2e-06	8.4e-06	1.2e-05	1.3e-05
Pu-242	1.2e-04	6.9e-05	1.2e-04	1.6e-04	1.8e-04	2.3e-05	1.4e-05	2.3e-05	3.2e-05	3.4e-05
Pu-244	1.9e+00	1.1e+00	1.8e+00	2.6e+00	2.8e+00	3.7e-01	2.3e-01	3.6e-01	5.0e-01	5.4e-01
Am-241	4.1e-02	2.4e-02	4.0e-02	5.6e-02	6.1e-02	8.0e-03	4.9e-03	7.8e-03	1.1e-02	1.2e-02
Am-242m	6.2e-02	3.6e-02	6.1e-02	8.6e-02	9.3e-02	1.2e-02	7.5e-03	1.2e-02	1.7e-02	1.8e-02
Am-243	8.3e-01	4.8e-01	8.1e-01	1.1e+00	1.2e+00	1.6e-01	1.0e-01	1.6e-01	2.2e-01	2.4e-01
Cm-242	6.4e-05	3.7e-05	6.2e-05	8.8e-05	9.6e-05	1.3e-05	7.6e-06	1.2e-05	1.7e-05	1.9e-05
Cm-243	5.3e-01	3.1e-01	5.2e-01	7.4e-01	8.0e-01	1.1e-01	6.4e-02	1.0e-01	1.4e-01	1.5e-01
Cm-244	1.1e-04	6.7e-05	1.1e-04	1.6e-04	1.7e-04	2.3e-05	1.4e-05	2.2e-05	3.1e-05	3.3e-05
Cm-245	3.2e-01	1.8e-01	3.1e-01	4.4e-01	4.7e-01	6.2e-02	3.8e-02	6.1e-02	8.4e-02	9.1e-02
Cm-246	1.1e-04	6.3e-05	1.1e-04	1.5e-04	1.6e-04	2.1e-05	1.3e-05	2.1e-05	2.9e-05	3.1e-05
Cm-247	1.7e+00	1.0e+00	1.7e+00	2.4e+00	2.6e+00	3.4e-01	2.1e-01	3.3e-01	4.6e-01	5.0e-01
Cm-248	8.2e-05	4.8e-05	8.0e-05	1.1e-04	1.2e-04	1.6e-05	9.8e-06	1.6e-05	2.2e-05	2.4e-05
Bk-249	1.6e-03	9.2e-04	1.6e-03	2.2e-03	2.4e-03	3.2e-04	1.9e-04	3.1e-04	4.3e-04	4.6e-04
Cf-248	7.6e-05	4.4e-05	7.4e-05	1.0e-04	1.1e-04	1.5e-05	9.1e-06	1.5e-05	2.0e-05	2.2e-05
Cf-249	1.7e+00	1.0e+00	1.7e+00	2.4e+00	2.6e+00	3.4e-01	2.1e-01	3.3e-01	4.6e-01	5.0e-01
Cf-250	1.1e-04	6.2e-05	1.0e-04	1.5e-04	1.6e-04	2.1e-05	1.3e-05	2.1e-05	2.8e-05	3.1e-05
Cf-251	4.9e-01	2.9e-01	4.8e-01	6.7e-01	7.3e-01	9.6e-02	5.9e-02	9.5e-02	1.3e-01	1.4e-01
Cf-252	1.4e-04	8.2e-05	1.4e-04	1.9e-04	2.1e-04	2.8e-05	1.7e-05	2.7e-05	3.7e-05	4.0e-05
Cf-254	3.0e-08	1.7e-08	2.9e-08	4.3e-08	4.8e-08	6.0e-09	3.4e-09	5.8e-09	8.4e-09	9.3e-09
Es-254	3.0e+00	1.7e+00	2.9e+00	4.1e+00	4.5e+00	5.9e-01	3.6e-01	5.8e-01	8.0e-01	8.7e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.32 Normalized effective dose equivalents from inhalation: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e-04	5.3e-05	1.1e-04	1.7e-04	2.0e-04	2.2e-05	1.1e-05	2.1e-05	3.3e-05	3.8e-05
P-32	5.0e-09	1.2e-09	3.9e-09	1.0e-08	1.3e-08	9.9e-10	2.3e-10	7.7e-10	2.0e-09	2.5e-09
S-35	1.3e-05	3.1e-06	1.2e-05	2.0e-05	2.3e-05	2.5e-06	1.2e-06	2.4e-06	3.8e-06	4.4e-06
Cl-36	1.8e-04	4.2e-05	1.6e-04	3.2e-04	4.0e-04	3.5e-05	8.5e-06	3.1e-05	6.4e-05	7.6e-05
K-40	2.1e-04	1.0e-04	2.0e-04	3.2e-04	3.7e-04	4.2e-05	2.0e-05	3.9e-05	6.3e-05	7.2e-05
Ca-41	4.4e-05	2.1e-05	4.1e-05	6.6e-05	7.6e-05	8.6e-06	4.3e-06	8.2e-06	1.3e-05	1.5e-05
Ca-45	8.6e-05	4.1e-05	8.1e-05	1.3e-04	1.5e-04	1.7e-05	8.4e-06	1.6e-05	2.5e-05	2.9e-05
Sc-46	1.6e-04	7.7e-05	1.5e-04	2.5e-04	2.9e-04	3.2e-05	1.5e-05	3.0e-05	4.9e-05	5.5e-05
Cr-51	1.7e-08	3.7e-09	1.4e-08	3.4e-08	4.1e-08	3.4e-09	7.4e-10	2.9e-09	6.5e-09	8.0e-09
Mn-53	1.5e-05	7.0e-06	1.4e-05	2.2e-05	2.5e-05	2.9e-06	1.4e-06	2.7e-06	4.3e-06	4.9e-06
Mn-54	1.2e-04	5.8e-05	1.2e-04	1.9e-04	2.1e-04	2.4e-05	1.2e-05	2.3e-05	3.6e-05	4.1e-05
Fe-55	9.8e-07	3.7e-07	8.8e-07	1.6e-06	1.9e-06	1.9e-07	7.5e-08	1.7e-07	3.2e-07	3.7e-07
Fe-59	3.6e-07	1.3e-07	3.2e-07	6.3e-07	7.5e-07	7.2e-08	2.6e-08	6.3e-08	1.2e-07	1.5e-07
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.2e-06	2.9e-06	5.8e-06	9.6e-06	1.1e-05	1.2e-06	5.8e-07	1.1e-06	1.9e-06	2.2e-06
Sr-89	1.1e-05	5.1e-06	1.0e-05	1.7e-05	2.0e-05	2.2e-06	1.0e-06	2.0e-06	3.4e-06	3.9e-06
Sr-90	7.9e-03	3.8e-03	7.5e-03	1.2e-02	1.4e-02	1.6e-03	7.8e-04	1.5e-03	2.3e-03	2.7e-03
Y-91	1.2e-04	5.8e-05	1.1e-04	1.9e-04	2.2e-04	2.4e-05	1.2e-05	2.3e-05	3.8e-05	4.3e-05
Zr-93	2.7e-03	1.3e-03	2.6e-03	4.1e-03	4.7e-03	5.4e-04	2.7e-04	5.1e-04	8.0e-04	9.2e-04
Zr-95	8.5e-05	4.0e-05	7.8e-05	1.3e-04	1.5e-04	1.7e-05	8.0e-06	1.5e-05	2.6e-05	2.9e-05
Nb-93m	9.3e-04	4.5e-04	8.7e-04	1.4e-03	1.6e-03	1.8e-04	9.1e-05	1.7e-04	2.7e-04	3.1e-04
Nb-94	1.3e-02	6.5e-03	1.3e-02	2.0e-02	2.3e-02	2.7e-03	1.3e-03	2.5e-03	3.9e-03	4.5e-03
Nb-95	2.7e-06	1.1e-06	2.4e-06	4.4e-06	5.1e-06	5.3e-07	2.3e-07	4.8e-07	8.5e-07	1.0e-06
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.0e-06	5.3e-07	1.7e-06	3.7e-06	4.5e-06	4.0e-07	1.1e-07	3.4e-07	7.3e-07	8.7e-07
Sb-125	1.2e-05	3.2e-06	1.0e-05	2.1e-05	2.5e-05	2.3e-06	6.3e-07	2.0e-06	4.1e-06	4.8e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.6e-05	3.7e-06	1.4e-05	3.0e-05	3.7e-05	3.2e-06	7.5e-07	2.8e-06	5.9e-06	7.1e-06
I-129	1.4e-03	3.3e-04	1.2e-03	2.6e-03	3.1e-03	2.8e-04	6.6e-05	2.4e-04	5.0e-04	6.0e-04
I-131	3.6e-12	1.9e-13	1.7e-12	9.3e-12	1.3e-11	7.1e-13	3.7e-14	3.4e-13	1.8e-12	2.6e-12
Cs-134	3.1e-05	8.6e-06	2.7e-05	5.5e-05	6.7e-05	6.0e-06	1.7e-06	5.3e-06	1.1e-05	1.3e-05
Cs-135	3.7e-06	1.0e-06	3.2e-06	6.6e-06	8.0e-06	7.3e-07	2.1e-07	6.3e-07	1.3e-06	1.6e-06
Cs-137	2.6e-05	7.1e-06	2.2e-05	4.6e-05	5.5e-05	5.0e-06	1.4e-06	4.4e-06	9.0e-06	1.1e-05
Ba-133	2.4e-04	1.2e-04	2.3e-04	3.7e-04	4.2e-04	4.8e-05	2.4e-05	4.6e-05	7.2e-05	8.2e-05
Ce-139	9.9e-05	4.8e-05	9.3e-05	1.5e-04	1.7e-04	2.0e-05	9.6e-06	1.8e-05	2.9e-05	3.4e-05
Ce-141	3.0e-06	1.2e-06	2.7e-06	4.9e-06	5.8e-06	5.9e-07	2.5e-07	5.3e-07	9.7e-07	1.1e-06
Ce-144	7.2e-03	3.5e-03	6.8e-03	1.1e-02	1.2e-02	1.4e-03	7.0e-04	1.3e-03	2.1e-03	2.4e-03
Pm-147	1.1e-03	5.3e-04	1.0e-03	1.7e-03	1.9e-03	2.1e-04	1.1e-04	2.0e-04	3.2e-04	3.6e-04

Table F1.32 Normalized effective dose equivalents from inhalation: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	9.7e-04	4.7e-04	9.2e-04	1.5e-03	1.7e-03	1.9e-04	9.5e-05	1.8e-04	2.8e-04	3.2e-04
Eu-152	7.0e-03	3.4e-03	6.6e-03	1.1e-02	1.2e-02	1.4e-03	6.8e-04	1.3e-03	2.0e-03	2.3e-03
Eu-154	8.9e-03	4.3e-03	8.4e-03	1.3e-02	1.5e-02	1.7e-03	8.7e-04	1.7e-03	2.6e-03	3.0e-03
Eu-155	1.2e-03	6.0e-04	1.2e-03	1.9e-03	2.1e-03	2.4e-04	1.2e-04	2.3e-04	3.6e-04	4.1e-04
Gd-153	1.7e-04	8.0e-05	1.6e-04	2.5e-04	2.9e-04	3.3e-05	1.6e-05	3.1e-05	4.9e-05	5.6e-05
Tb-160	1.0e-04	4.8e-05	9.5e-05	1.5e-04	1.8e-04	2.0e-05	9.7e-06	1.9e-05	3.1e-05	3.5e-05
Tm-170	2.7e-04	1.3e-04	2.5e-04	4.1e-04	4.7e-04	5.3e-05	2.6e-05	5.0e-05	7.9e-05	9.0e-05
Tm-171	2.4e-04	1.2e-04	2.3e-04	3.6e-04	4.2e-04	4.7e-05	2.4e-05	4.5e-05	7.1e-05	8.0e-05
Ta-182	4.0e-04	1.9e-04	3.7e-04	6.1e-04	6.9e-04	7.8e-05	3.8e-05	7.4e-05	1.2e-04	1.3e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.9e-01	1.4e-01	2.7e-01	4.4e-01	5.0e-01	5.7e-02	2.8e-02	5.4e-02	8.5e-02	9.7e-02
Ra-228	2.2e+00	1.1e+00	2.1e+00	3.4e+00	3.9e+00	4.4e-01	2.2e-01	4.2e-01	6.6e-01	7.5e-01
Ac-227	4.2e+01	2.0e+01	4.0e+01	6.3e+01	7.3e+01	8.3e+00	4.1e+00	7.8e+00	1.2e+01	1.4e+01
Th-228	9.1e+00	4.4e+00	8.5e+00	1.4e+01	1.6e+01	1.8e+00	8.9e-01	1.7e+00	2.7e+00	3.0e+00
Th-229	5.7e+01	2.7e+01	5.4e+01	8.5e+01	9.8e+01	1.1e+01	5.6e+00	1.1e+01	1.7e+01	1.9e+01
Th-230	8.5e+00	4.1e+00	8.0e+00	1.3e+01	1.5e+01	1.7e+00	8.3e-01	1.6e+00	2.5e+00	2.9e+00
Th-232	3.8e+01	1.8e+01	3.5e+01	5.7e+01	6.5e+01	7.4e+00	3.7e+00	7.0e+00	1.1e+01	1.3e+01
Pa-231	2.9e+01	1.4e+01	2.7e+01	4.4e+01	5.0e+01	5.7e+00	2.8e+00	5.4e+00	8.4e+00	9.6e+00
U-232	2.3e+01	1.1e+01	2.2e+01	3.6e+01	4.1e+01	4.6e+00	2.3e+00	4.4e+00	6.9e+00	7.9e+00
U-233	4.4e+00	2.1e+00	4.2e+00	6.7e+00	7.6e+00	8.7e-01	4.3e-01	8.2e-01	1.3e+00	1.5e+00
U-234	4.3e+00	2.1e+00	4.1e+00	6.5e+00	7.5e+00	8.5e-01	4.2e-01	8.0e-01	1.3e+00	1.4e+00
U-235	4.0e+00	1.9e+00	3.8e+00	6.0e+00	6.9e+00	7.9e-01	3.9e-01	7.5e-01	1.2e+00	1.3e+00
U-236	4.1e+00	2.0e+00	3.9e+00	6.2e+00	7.1e+00	8.0e-01	4.0e-01	7.6e-01	1.2e+00	1.4e+00
U-238	3.9e+00	1.9e+00	3.6e+00	5.8e+00	6.7e+00	7.6e-01	3.8e-01	7.2e-01	1.1e+00	1.3e+00
Np-237	1.8e+01	8.5e+00	1.7e+01	2.7e+01	3.0e+01	3.5e+00	1.7e+00	3.3e+00	5.2e+00	5.9e+00
Pu-236	3.8e+00	1.8e+00	3.6e+00	5.7e+00	6.5e+00	7.4e-01	3.7e-01	7.0e-01	1.1e+00	1.3e+00
Pu-238	9.3e+00	4.5e+00	8.8e+00	1.4e+01	1.6e+01	1.8e+00	9.1e-01	1.7e+00	2.7e+00	3.1e+00
Pu-239	1.0e+01	4.8e+00	9.5e+00	1.5e+01	1.7e+01	2.0e+00	9.8e-01	1.9e+00	2.9e+00	3.3e+00
Pu-240	1.0e+01	4.8e+00	9.5e+00	1.5e+01	1.7e+01	2.0e+00	9.8e-01	1.9e+00	2.9e+00	3.3e+00
Pu-241	1.7e-01	8.2e-02	1.6e-01	2.6e-01	2.9e-01	3.4e-02	1.7e-02	3.2e-02	5.0e-02	5.7e-02
Pu-242	9.5e+00	4.6e+00	9.0e+00	1.4e+01	1.6e+01	1.9e+00	9.3e-01	1.8e+00	2.8e+00	3.2e+00
Pu-244	9.4e+00	4.5e+00	8.9e+00	1.4e+01	1.6e+01	1.9e+00	9.2e-01	1.8e+00	2.8e+00	3.1e+00
Am-241	1.4e+01	7.0e+00	1.4e+01	2.2e+01	2.5e+01	2.8e+00	1.4e+00	2.7e+00	4.2e+00	4.8e+00
Am-242m	1.4e+01	6.9e+00	1.3e+01	2.2e+01	2.5e+01	2.8e+00	1.4e+00	2.7e+00	4.2e+00	4.8e+00
Am-243	1.4e+01	6.9e+00	1.4e+01	2.2e+01	2.5e+01	2.8e+00	1.4e+00	2.7e+00	4.2e+00	4.8e+00
Cm-242	2.5e-01	1.2e-01	2.4e-01	3.8e-01	4.4e-01	5.0e-02	2.5e-02	4.7e-02	7.4e-02	8.5e-02
Cm-243	9.9e+00	4.8e+00	9.3e+00	1.5e+01	1.7e+01	1.9e+00	9.6e-01	1.8e+00	2.9e+00	3.3e+00
Cm-244	7.9e+00	3.8e+00	7.4e+00	1.2e+01	1.4e+01	1.6e+00	7.7e-01	1.5e+00	2.3e+00	2.6e+00
Cm-245	1.5e+01	7.2e+00	1.4e+01	2.2e+01	2.6e+01	2.9e+00	1.5e+00	2.8e+00	4.3e+00	5.0e+00
Cm-246	1.5e+01	7.1e+00	1.4e+01	2.2e+01	2.5e+01	2.9e+00	1.4e+00	2.7e+00	4.3e+00	4.9e+00
Cm-247	1.3e+01	6.5e+00	1.3e+01	2.0e+01	2.3e+01	2.7e+00	1.3e+00	2.5e+00	3.9e+00	4.5e+00
Cm-248	5.4e+01	2.6e+01	5.1e+01	8.1e+01	9.3e+01	1.1e+01	5.3e+00	1.0e+01	1.6e+01	1.8e+01
Bk-249	4.0e-02	1.9e-02	3.8e-02	6.0e-02	6.9e-02	7.8e-03	3.9e-03	7.4e-03	1.2e-02	1.3e-02
Cf-248	1.2e+00	5.8e-01	1.1e+00	1.8e+00	2.1e+00	2.4e-01	1.2e-01	2.2e-01	3.5e-01	4.0e-01
Cf-249	1.2e+01	6.0e+00	1.2e+01	1.9e+01	2.1e+01	2.4e+00	1.2e+00	2.3e+00	3.6e+00	4.1e+00
Cf-250	6.5e+00	3.1e+00	6.1e+00	9.8e+00	1.1e+01	1.3e+00	6.4e-01	1.2e+00	1.9e+00	2.2e+00
Cf-251	1.3e+01	6.1e+00	1.2e+01	1.9e+01	2.2e+01	2.5e+00	1.2e+00	2.4e+00	3.7e+00	4.2e+00
Cf-252	4.4e+00	2.1e+00	4.1e+00	6.6e+00	7.5e+00	8.6e-01	4.3e-01	8.1e-01	1.3e+00	1.5e+00
Cf-254	8.1e-01	3.8e-01	7.4e-01	1.3e+00	1.5e+00	1.6e-01	7.5e-02	1.5e-01	2.5e-01	2.8e-01
Es-254	9.4e-01	4.5e-01	8.8e-01	1.4e+00	1.6e+00	1.8e-01	9.2e-02	1.7e-01	2.7e-01	3.1e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.33 Normalized effective dose equivalents from ingestion: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.6e-04	5.3e-05	5.4e-04	1.1e-03	1.2e-03	1.1e-04	1.0e-05	1.1e-04	2.0e-04	2.3e-04
P-32	2.4e-08	1.6e-09	1.7e-08	5.5e-08	7.2e-08	4.8e-09	3.2e-10	3.4e-09	1.1e-08	1.4e-08
S-35	7.8e-06	7.4e-07	7.5e-06	1.5e-05	1.6e-05	1.5e-06	1.5e-07	1.5e-06	2.8e-06	3.2e-06
Cl-36	8.3e-05	5.3e-06	6.5e-05	1.8e-04	2.2e-04	1.6e-05	1.1e-06	1.3e-05	3.5e-05	4.3e-05
K-40	1.1e-03	1.0e-04	1.0e-03	2.0e-03	2.3e-03	2.1e-04	2.0e-05	2.0e-04	3.9e-04	4.3e-04
Ca-41	1.4e-04	1.3e-05	1.3e-04	2.6e-04	2.9e-04	2.7e-05	2.6e-06	2.7e-05	5.0e-05	5.6e-05
Ca-45	1.4e-04	1.3e-05	1.3e-04	2.6e-04	2.9e-04	2.7e-05	2.6e-06	2.6e-05	5.0e-05	5.5e-05
Sc-46	1.2e-04	1.1e-05	1.1e-04	2.2e-04	2.5e-04	2.3e-05	2.2e-06	2.2e-05	4.3e-05	4.8e-05
Cr-51	2.5e-08	1.7e-09	1.9e-08	5.6e-08	7.1e-08	5.0e-09	3.3e-10	3.9e-09	1.1e-08	1.4e-08
Mn-53	1.1e-05	1.0e-06	1.0e-05	2.0e-05	2.2e-05	2.1e-06	2.0e-07	2.0e-06	3.9e-06	4.3e-06
Mn-54	1.7e-04	1.6e-05	1.6e-04	3.2e-04	3.5e-04	3.3e-05	3.2e-06	3.2e-05	6.2e-05	6.8e-05
Fe-55	1.5e-06	1.3e-07	1.3e-06	3.0e-06	3.5e-06	2.9e-07	2.5e-08	2.6e-07	5.9e-07	6.8e-07
Fe-59	8.7e-07	5.4e-08	5.7e-07	1.3e-06	1.6e-06	1.3e-07	1.1e-08	1.1e-07	2.6e-07	3.2e-07
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.2e-05	2.1e-06	2.0e-05	4.0e-05	4.6e-05	4.2e-06	4.0e-07	4.0e-06	7.9e-06	9.0e-06
Sr-89	5.3e-05	4.9e-06	4.9e-05	9.9e-05	1.1e-04	1.0e-05	9.6e-07	9.8e-06	1.9e-05	2.2e-05
Sr-90	1.7e-02	1.6e-03	1.6e-02	3.1e-02	3.4e-02	3.3e-03	3.1e-04	3.2e-03	6.0e-03	6.6e-03
Y-91	8.1e-05	7.6e-06	7.6e-05	1.5e-04	1.7e-04	1.6e-05	1.5e-06	1.5e-05	3.0e-05	3.4e-05
Zr-93	1.8e-04	1.7e-05	1.8e-04	3.4e-04	3.8e-04	3.6e-05	3.4e-06	3.5e-05	6.6e-05	7.3e-05
Zr-95	9.1e-05	8.7e-06	8.7e-05	1.7e-04	1.9e-04	1.8e-05	1.7e-06	1.7e-05	3.3e-05	3.8e-05
Nb-93m	5.6e-05	5.3e-06	5.4e-05	1.0e-04	1.1e-04	1.1e-05	1.0e-06	1.1e-05	2.0e-05	2.2e-05
Nb-94	7.8e-04	7.4e-05	7.6e-04	1.4e-03	1.6e-03	1.5e-04	1.5e-05	1.5e-04	2.8e-04	3.1e-04
Nb-95	4.0e-06	3.5e-07	3.6e-06	7.7e-06	9.1e-06	7.8e-07	7.1e-08	7.2e-07	1.5e-06	1.8e-06
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.8e-06	2.0e-07	2.2e-06	5.9e-06	7.3e-06	5.4e-07	4.1e-08	4.3e-07	1.2e-06	1.4e-06
Sb-125	1.0e-05	7.8e-07	8.3e-06	2.2e-05	2.7e-05	2.0e-06	1.5e-07	1.6e-06	4.2e-06	5.2e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	8.7e-05	5.9e-06	6.8e-05	1.9e-04	2.3e-04	1.7e-05	1.2e-06	1.3e-05	3.7e-05	4.5e-05
I-129	7.5e-03	5.0e-04	5.9e-03	1.6e-02	1.9e-02	1.5e-03	1.0e-04	1.2e-03	3.2e-03	3.8e-03
I-131	1.9e-11	4.4e-13	7.9e-12	5.2e-11	7.9e-11	3.8e-12	8.7e-14	1.6e-12	1.0e-11	1.6e-11
Cs-134	1.6e-04	1.2e-05	1.3e-04	3.5e-04	4.3e-04	3.2e-05	2.4e-06	2.6e-05	6.8e-05	8.4e-05
Cs-135	1.9e-05	1.4e-06	1.5e-05	4.1e-05	5.1e-05	3.8e-06	2.8e-07	3.1e-06	8.0e-06	9.9e-06
Cs-137	1.3e-04	9.9e-06	1.1e-04	2.9e-04	3.6e-04	2.6e-05	1.9e-06	2.1e-05	5.6e-05	6.9e-05
Ba-133	3.6e-04	3.4e-05	3.5e-04	8.7e-04	7.4e-04	7.0e-05	6.7e-06	6.9e-05	1.3e-04	1.4e-04
Ce-139	4.2e-05	4.0e-06	4.1e-05	7.8e-05	8.8e-05	8.3e-06	8.1e-07	8.0e-06	1.5e-05	1.7e-05
Ce-141	3.2e-06	2.9e-07	2.9e-06	6.3e-06	7.4e-06	5.4e-07	5.7e-08	5.8e-07	1.2e-06	1.5e-06
Ce-144	1.4e-03	1.3e-04	1.3e-03	2.5e-03	2.8e-03	2.7e-04	2.6e-05	2.6e-04	4.9e-04	5.5e-04
Pm-147	9.8e-05	9.3e-06	9.5e-05	1.8e-04	2.0e-04	1.9e-05	1.9e-06	1.9e-05	3.5e-05	3.9e-05

Table F1.33 Normalized effective dose equivalents from ingestion: Building road with slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.2e-05	4.1e-06	4.1e-05	7.9e-05	8.7e-05	6.3e-06	6.0e-07	6.1e-06	1.5e-05	1.7e-05
Eu-152	6.9e-04	6.6e-05	6.6e-04	1.3e-03	1.4e-03	1.4e-04	1.3e-05	1.3e-04	2.5e-04	2.7e-04
Eu-154	1.0e-03	9.5e-05	9.6e-04	1.9e-03	2.1e-03	2.0e-04	1.9e-05	1.9e-04	3.6e-04	4.0e-04
Eu-155	1.5e-04	1.5e-05	1.5e-04	2.9e-04	3.2e-04	3.0e-05	2.9e-06	2.9e-05	5.6e-05	6.1e-05
Gd-153	6.9e-05	6.6e-06	6.7e-05	1.3e-04	1.4e-04	1.4e-05	1.3e-06	1.3e-05	2.5e-05	2.8e-05
Tb-160	9.3e-05	8.8e-06	8.8e-05	1.7e-04	2.0e-04	1.8e-05	1.7e-06	1.8e-05	3.4e-05	3.8e-05
Tm-170	1.8e-04	1.7e-05	1.7e-04	3.3e-04	3.7e-04	3.5e-05	3.4e-06	3.4e-05	6.5e-05	7.3e-05
Tm-171	3.8e-05	3.6e-06	3.7e-05	7.0e-05	7.8e-05	7.5e-06	7.2e-07	7.2e-06	1.4e-05	1.5e-05
Ta-182	1.9e-04	1.8e-05	1.9e-04	3.6e-04	4.0e-04	3.8e-05	3.7e-06	3.7e-05	7.0e-05	7.8e-05
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.6e-01	1.5e-02	1.5e-01	2.9e-01	3.2e-01	3.1e-02	2.9e-03	3.0e-02	5.7e-02	6.3e-02
Ra-228	1.6e-01	1.5e-02	1.6e-01	3.0e-01	3.4e-01	3.2e-02	3.1e-03	3.1e-02	5.9e-02	6.5e-02
Ac-227	1.6e+00	1.5e-01	1.5e+00	2.9e+00	3.3e+00	3.1e-01	3.0e-02	3.0e-01	5.7e-01	6.4e-01
Th-228	7.1e-02	6.8e-03	6.9e-02	1.3e-01	1.5e-01	1.4e-02	1.4e-03	1.4e-02	2.6e-02	2.9e-02
Th-229	4.4e-01	4.2e-02	4.3e-01	8.2e-01	9.1e-01	8.7e-02	8.3e-03	8.4e-02	1.6e-01	1.8e-01
Th-230	6.0e-02	5.7e-03	5.8e-02	1.1e-01	1.2e-01	1.2e-02	1.1e-03	1.1e-02	2.2e-02	2.4e-02
Th-232	3.1e-01	2.9e-02	3.0e-01	5.8e-01	6.4e-01	6.1e-02	5.9e-03	5.9e-02	1.1e-01	1.2e-01
Pa-231	1.2e+00	1.1e-01	1.2e+00	2.2e+00	2.5e+00	2.3e-01	2.2e-02	2.3e-01	4.3e-01	4.8e-01
U-232	2.5e-02	2.3e-03	2.4e-02	4.6e-02	5.1e-02	4.8e-03	4.6e-04	4.7e-03	8.9e-03	9.8e-03
U-233	2.9e-03	2.8e-04	2.8e-03	5.4e-03	6.0e-03	5.7e-04	5.5e-05	5.6e-04	1.1e-03	1.2e-03
U-234	2.9e-03	2.7e-04	2.8e-03	5.3e-03	5.9e-03	5.6e-04	5.4e-05	5.5e-04	1.0e-03	1.1e-03
U-235	3.1e-03	2.9e-04	3.0e-03	5.7e-03	6.4e-03	6.1e-04	5.8e-05	5.9e-04	1.1e-03	1.2e-03
U-236	2.7e-03	2.5e-04	2.6e-03	5.0e-03	5.6e-03	5.3e-04	5.1e-05	5.2e-04	9.8e-04	1.1e-03
U-238	4.1e-03	3.9e-04	4.0e-03	7.6e-03	8.4e-03	8.1e-04	7.7e-05	7.8e-04	1.5e-03	1.6e-03
Np-237	4.9e-01	4.6e-02	4.7e-01	9.0e-01	1.0e+00	9.6e-02	9.1e-03	9.3e-02	1.8e-01	1.9e-01
Pu-236	1.1e-01	1.1e-02	1.1e-01	2.1e-01	2.3e-01	2.2e-02	2.1e-03	2.1e-02	4.0e-02	4.4e-02
Pu-238	3.5e-01	3.3e-02	3.4e-01	6.5e-01	7.2e-01	6.9e-02	6.6e-03	6.7e-02	1.3e-01	1.4e-01
Pu-239	3.9e-01	3.7e-02	3.7e-01	7.2e-01	8.0e-01	7.6e-02	7.3e-03	7.4e-02	1.4e-01	1.5e-01
Pu-240	3.9e-01	3.7e-02	3.7e-01	7.2e-01	8.0e-01	7.6e-02	7.3e-03	7.4e-02	1.4e-01	1.5e-01
Pu-241	7.7e-03	7.3e-04	7.4e-03	1.4e-02	1.6e-02	1.5e-03	1.4e-04	1.5e-03	2.8e-03	3.1e-03
Pu-242	3.7e-01	3.5e-02	3.6e-01	6.8e-01	7.6e-01	7.2e-02	7.0e-03	7.0e-02	1.3e-01	1.5e-01
Pu-244	3.6e-01	3.5e-02	3.5e-01	6.7e-01	7.5e-01	7.2e-02	6.9e-03	6.9e-02	1.3e-01	1.5e-01
Am-241	4.0e-01	3.8e-02	3.8e-01	7.4e-01	8.2e-01	7.8e-02	7.5e-03	7.6e-02	1.4e-01	1.6e-01
Am-242m	4.0e-01	3.8e-02	3.8e-01	7.3e-01	8.2e-01	7.8e-02	7.4e-03	7.6e-02	1.4e-01	1.6e-01
Am-243	4.0e-01	3.8e-02	3.8e-01	7.4e-01	8.2e-01	7.8e-02	7.4e-03	7.6e-02	1.4e-01	1.6e-01
Cm-242	6.1e-03	5.8e-04	5.9e-03	1.1e-02	1.3e-02	1.2e-03	1.2e-04	1.2e-03	2.2e-03	2.4e-03
Cm-243	2.7e-01	2.6e-02	2.6e-01	5.0e-01	5.6e-01	5.3e-02	5.1e-03	5.2e-02	9.8e-02	1.1e-01
Cm-244	2.2e-01	2.0e-02	2.1e-01	4.0e-01	4.4e-01	4.2e-02	4.0e-03	4.1e-02	7.8e-02	8.6e-02
Cm-245	4.1e-01	3.9e-02	4.0e-01	7.6e-01	8.4e-01	8.1e-02	7.7e-03	7.8e-02	1.5e-01	1.6e-01
Cm-246	4.0e-01	3.8e-02	3.9e-01	7.5e-01	8.3e-01	8.0e-02	7.6e-03	7.8e-02	1.5e-01	1.6e-01
Cm-247	3.7e-01	3.5e-02	3.6e-01	6.9e-01	7.7e-01	7.4e-02	7.0e-03	7.2e-02	1.3e-01	1.5e-01
Cm-248	1.5e+00	1.4e-01	1.4e+00	2.8e+00	3.1e+00	2.9e-01	2.8e-02	2.9e-01	5.4e-01	5.9e-01
Bk-249	1.3e-03	1.2e-04	1.3e-03	2.4e-03	2.7e-03	2.6e-04	2.5e-05	2.5e-04	4.7e-04	5.2e-04
Cf-248	2.7e-02	2.6e-03	2.6e-02	5.1e-02	5.6e-02	5.4e-03	5.2e-04	5.2e-03	9.9e-03	1.1e-02
Cf-249	5.2e-01	4.9e-02	5.0e-01	9.6e-01	1.1e+00	1.0e-01	9.7e-03	9.9e-02	1.9e-01	2.1e-01
Cf-250	2.3e-01	2.2e-02	2.2e-01	4.2e-01	4.7e-01	4.4e-02	4.3e-03	4.3e-02	8.2e-02	9.0e-02
Cf-251	5.3e-01	5.0e-02	5.1e-01	9.8e-01	1.1e+00	1.0e-01	1.0e-02	1.0e-01	1.9e-01	2.1e-01
Cf-252	1.0e-01	9.7e-03	9.8e-02	1.9e-01	2.1e-01	2.0e-02	1.9e-03	1.9e-02	3.7e-02	4.1e-02
Cf-254	2.2e-02	2.1e-03	2.1e-02	4.2e-02	4.8e-02	4.4e-03	4.2e-04	4.2e-03	8.2e-03	9.4e-03
Es-254	2.5e-02	2.4e-03	2.5e-02	4.7e-02	5.3e-02	5.0e-03	4.8e-04	4.9e-03	9.2e-03	1.0e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.34 Normalized effective dose equivalents from all pathways: Slag basement

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.2e+00	1.7e-01	7.2e-01	2.3e+00	3.6e+00	2.4e-01	3.4e-02	1.4e-01	4.7e-01	7.1e-01
P-32	7.1e-08	1.7e-10	7.0e-09	1.8e-07	3.2e-07	1.4e-08	3.5e-11	1.4e-09	3.6e-08	6.3e-08
S-35	2.2e-07	2.7e-08	1.2e-07	4.3e-07	6.7e-07	4.3e-08	5.3e-09	2.4e-08	8.6e-08	1.3e-07
Cl-36	1.6e-04	1.5e-05	8.7e-05	3.3e-04	5.1e-04	3.2e-05	3.0e-06	1.7e-05	6.5e-05	9.9e-05
K-40	1.2e-01	1.7e-02	7.0e-02	2.3e-01	3.6e-01	2.4e-02	3.4e-03	1.4e-02	4.5e-02	7.0e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	4.0e-06	5.6e-07	2.4e-06	7.9e-06	1.2e-05	7.9e-07	1.1e-07	4.6e-07	1.5e-06	2.3e-06
Sc-46	1.9e-01	2.4e-02	1.1e-01	3.8e-01	5.9e-01	3.8e-02	4.7e-03	2.1e-02	7.6e-02	1.1e-01
Cr-51	2.1e-05	5.1e-07	5.8e-06	4.7e-05	8.6e-05	4.1e-06	1.0e-07	1.2e-06	9.3e-06	1.7e-05
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.8e-01	6.7e-02	2.8e-01	9.1e-01	1.4e+00	9.5e-02	1.3e-02	5.6e-02	1.8e-01	2.8e-01
Fe-55	2.8e-12	2.8e-13	1.6e-12	5.6e-12	8.6e-12	5.5e-13	5.6e-14	3.2e-13	1.1e-12	1.7e-12
Fe-59	4.9e-04	3.1e-05	2.1e-04	1.1e-03	1.7e-03	9.7e-05	6.2e-06	4.2e-05	2.1e-04	3.3e-04
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.3e-02	2.5e-03	1.2e-02	4.7e-02	7.2e-02	4.6e-03	5.0e-04	2.4e-03	9.2e-03	1.4e-02
Sr-89	4.7e-05	4.2e-06	2.3e-05	9.7e-05	1.5e-04	9.2e-06	8.4e-07	4.5e-06	1.9e-05	3.0e-05
Sr-90	7.0e-03	9.8e-04	4.1e-03	1.3e-02	2.1e-02	1.4e-03	2.0e-04	8.1e-04	2.6e-03	4.0e-03
Y-91	2.1e-04	2.2e-05	1.1e-04	4.4e-04	6.7e-04	4.2e-05	4.3e-06	2.2e-05	8.6e-05	1.3e-04
Zr-93	1.3e-05	1.8e-06	7.5e-06	2.4e-05	3.8e-05	2.5e-06	3.6e-07	1.5e-06	4.8e-06	7.5e-06
Zr-95	1.0e-01	1.2e-02	5.6e-02	2.1e-01	3.2e-01	2.1e-02	2.3e-03	1.1e-02	4.2e-02	6.4e-02
Nb-93m	1.3e-05	1.8e-06	7.5e-06	2.4e-05	3.8e-05	2.5e-06	3.6e-07	1.5e-06	4.8e-06	7.3e-06
Nb-94	2.2e+00	3.1e-01	1.3e+00	4.1e+00	6.5e+00	4.3e-01	6.2e-02	2.6e-01	8.3e-01	1.3e+00
Nb-95	4.5e-03	2.6e-04	1.8e-03	1.0e-02	1.6e-02	8.9e-04	5.2e-05	3.6e-04	2.0e-03	3.2e-03
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.3e-03	1.5e-04	1.0e-03	4.9e-03	7.7e-03	4.5e-04	3.0e-05	2.0e-04	9.8e-04	1.5e-03
Sb-125	1.4e-02	1.2e-03	7.2e-03	2.7e-02	4.3e-02	2.7e-03	2.3e-04	1.4e-03	5.4e-03	8.4e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.2e-05	8.8e-07	5.7e-06	2.7e-05	4.2e-05	2.4e-06	1.8e-07	1.1e-06	5.3e-06	8.2e-06
I-129	3.6e-04	3.2e-05	1.9e-04	7.2e-04	1.1e-03	7.1e-05	6.4e-06	3.8e-05	1.4e-04	2.2e-04
I-131	1.3e-08	1.6e-13	1.0e-10	2.5e-08	6.0e-08	2.5e-09	3.5e-14	2.0e-11	4.9e-09	1.2e-08
Cs-134	3.8e-02	3.8e-03	2.1e-02	7.7e-02	1.2e-01	7.5e-03	7.7e-04	4.1e-03	1.5e-02	2.4e-02
Cs-135	5.9e-07	8.0e-08	3.2e-07	1.2e-06	1.9e-06	1.2e-07	1.2e-08	6.4e-08	2.3e-07	3.7e-07
Cs-137	1.9e-02	1.9e-03	1.0e-02	3.8e-02	6.0e-02	3.7e-03	3.8e-04	2.0e-03	7.5e-03	1.2e-02
Ba-133	4.2e-01	5.9e-02	2.4e-01	7.8e-01	1.2e+00	8.2e-02	1.2e-02	4.8e-02	1.6e-01	2.4e-01
Ce-139	2.3e-02	3.2e-03	1.4e-02	4.5e-02	6.9e-02	4.6e-03	6.4e-04	2.7e-03	8.9e-03	1.4e-02
Ce-141	2.0e-04	1.0e-05	7.7e-05	4.6e-04	7.4e-04	4.0e-05	2.0e-06	1.5e-05	8.9e-05	1.5e-04
Ce-144	2.7e-02	3.8e-03	1.6e-02	5.1e-02	8.0e-02	5.3e-03	7.6e-04	3.1e-03	1.0e-02	1.6e-02
Pm-147	8.9e-06	1.3e-06	5.2e-06	1.7e-05	2.6e-05	1.8e-06	2.5e-07	1.0e-06	3.4e-06	5.1e-06

Table F1.34 Normalized effective dose equivalents from all pathways: Slag basement

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.2e-07	3.1e-08	1.3e-07	4.0e-07	6.4e-07	4.2e-08	6.0e-09	2.5e-08	8.1e-08	1.2e-07
Eu-152	1.5e+00	2.1e-01	8.9e-01	2.9e+00	4.5e+00	3.0e-01	4.3e-02	1.8e-01	5.7e-01	8.8e-01
Eu-154	1.4e+00	2.0e-01	8.5e-01	2.7e+00	4.3e+00	2.8e-01	4.0e-02	1.7e-01	5.4e-01	8.3e-01
Eu-155	2.8e-02	4.0e-03	1.7e-02	5.3e-02	8.4e-02	5.6e-03	8.0e-04	3.3e-03	1.1e-02	1.6e-02
Gd-153	1.5e-02	2.1e-03	8.9e-03	2.9e-02	4.5e-02	3.0e-03	4.3e-04	1.8e-03	5.8e-03	8.8e-03
Tb-160	7.3e-02	8.5e-03	4.0e-02	1.5e-01	2.3e-01	1.4e-02	1.7e-03	7.8e-03	2.9e-02	4.4e-02
Tm-170	3.3e-04	4.4e-05	1.9e-04	6.3e-04	9.8e-04	6.4e-05	8.8e-06	3.7e-05	1.2e-04	1.9e-04
Tm-171	1.1e-04	1.5e-05	6.3e-05	2.0e-04	3.1e-04	2.1e-05	3.0e-06	1.2e-05	4.0e-05	6.2e-05
Ta-182	2.3e-01	3.0e-02	1.3e-01	4.4e-01	6.8e-01	4.5e-02	6.1e-03	2.6e-02	8.7e-02	1.3e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.4e+00	3.4e-01	1.4e+00	4.6e+00	7.2e+00	4.8e-01	6.8e-02	2.8e-01	9.1e-01	1.4e+00
Ra-228	1.9e+00	2.7e-01	1.1e+00	3.6e+00	5.7e+00	3.8e-01	5.4e-02	2.2e-01	7.2e-01	1.1e+00
Ac-227	4.7e-01	6.5e-02	2.7e-01	8.7e-01	1.4e+00	9.1e-02	1.3e-02	5.4e-02	1.7e-01	2.7e-01
Th-228	1.4e+00	2.0e-01	8.2e-01	2.6e+00	4.1e+00	2.7e-01	3.9e-02	1.6e-01	5.3e-01	8.1e-01
Th-229	3.4e-01	4.8e-02	2.0e-01	6.4e-01	1.0e+00	6.7e-02	9.5e-03	3.9e-02	1.3e-01	1.9e-01
Th-230	1.0e-01	1.5e-02	6.1e-02	2.0e-01	3.1e-01	2.0e-02	2.9e-03	1.2e-02	3.9e-02	6.0e-02
Th-232	3.2e+00	4.5e-01	1.9e+00	6.1e+00	9.5e+00	6.3e-01	9.0e-02	3.7e-01	1.2e+00	1.9e+00
Pa-231	5.0e-01	7.0e-02	2.9e-01	9.3e-01	1.5e+00	9.8e-02	1.4e-02	5.8e-02	1.9e-01	2.9e-01
U-232	1.8e+00	2.6e-01	1.1e+00	3.4e+00	5.4e+00	3.5e-01	5.1e-02	2.1e-01	6.8e-01	1.1e+00
U-233	3.4e-03	4.8e-04	2.0e-03	6.4e-03	1.0e-02	6.7e-04	9.5e-05	3.9e-04	1.3e-03	2.0e-03
U-234	1.2e-04	1.7e-05	6.9e-05	2.2e-04	3.5e-04	2.3e-05	3.3e-06	1.4e-05	4.4e-05	6.8e-05
U-235	1.7e-01	2.4e-02	1.0e-01	3.3e-01	5.1e-01	3.4e-02	4.8e-03	2.0e-02	6.5e-02	1.0e-01
U-236	3.4e-05	4.8e-06	2.0e-05	6.4e-05	1.0e-04	6.7e-06	9.6e-07	4.0e-06	1.3e-05	2.0e-05
U-238	3.5e-02	4.9e-03	2.0e-02	6.5e-02	1.0e-01	6.8e-03	9.7e-04	4.0e-03	1.3e-02	2.0e-02
Np-237	2.6e-01	3.6e-02	1.5e-01	4.9e-01	7.7e-01	5.1e-02	7.3e-03	3.0e-02	9.7e-02	1.5e-01
Pu-236	7.2e-02	1.0e-02	4.2e-02	1.3e-01	2.1e-01	1.4e-02	2.0e-03	8.3e-03	2.7e-02	4.2e-02
Pu-238	2.1e-05	2.9e-06	1.2e-05	3.9e-05	6.2e-05	4.1e-06	5.8e-07	2.4e-06	7.8e-06	1.2e-05
Pu-239	6.2e-05	8.7e-06	3.6e-05	1.2e-04	1.8e-04	1.2e-05	1.7e-06	7.2e-06	2.3e-05	3.6e-05
Pu-240	2.0e-05	2.8e-06	1.2e-05	3.8e-05	6.0e-05	4.0e-06	5.7e-07	2.4e-06	7.6e-06	1.2e-05
Pu-241	1.9e-04	2.7e-05	1.1e-04	3.6e-04	5.7e-04	3.8e-05	5.3e-06	2.2e-05	7.2e-05	1.1e-04
Pu-242	1.8e-05	2.5e-06	1.1e-05	3.4e-05	5.4e-05	3.5e-06	5.0e-07	2.1e-06	6.8e-06	1.0e-05
Pu-244	4.5e-01	6.3e-02	2.6e-01	8.4e-01	1.3e+00	8.8e-02	1.2e-02	5.2e-02	1.7e-01	2.6e-01
Am-241	6.5e-03	9.1e-04	3.8e-03	1.2e-02	1.9e-02	1.3e-03	1.8e-04	7.5e-04	2.4e-03	3.7e-03
Am-242m	1.4e-02	1.9e-03	8.1e-03	2.6e-02	4.1e-02	2.7e-03	3.8e-04	1.6e-03	5.2e-03	7.9e-03
Am-243	1.9e-01	2.7e-02	1.1e-01	3.6e-01	5.6e-01	3.7e-02	5.3e-03	2.2e-02	7.1e-02	1.1e-01
Cm-242	5.1e-06	7.1e-07	3.0e-06	9.8e-06	1.5e-05	1.0e-06	1.4e-07	5.9e-07	1.9e-06	3.0e-06
Cm-243	1.2e-01	1.7e-02	7.0e-02	2.3e-01	3.6e-01	2.4e-02	3.4e-03	1.4e-02	4.5e-02	6.9e-02
Cm-244	1.8e-05	2.5e-06	1.1e-05	3.4e-05	5.4e-05	3.5e-06	5.0e-07	2.1e-06	6.8e-06	1.0e-05
Cm-245	7.5e-02	1.1e-02	4.4e-02	1.4e-01	2.2e-01	1.5e-02	2.1e-03	8.7e-03	2.8e-02	4.3e-02
Cm-246	1.1e-05	1.6e-06	6.7e-06	2.1e-05	3.4e-05	2.2e-06	3.2e-07	1.3e-06	4.3e-06	6.5e-06
Cm-247	4.3e-01	6.0e-02	2.5e-01	8.0e-01	1.3e+00	8.4e-02	1.2e-02	4.9e-02	1.6e-01	2.4e-01
Cm-248	1.0e-05	1.5e-06	6.1e-06	2.0e-05	3.1e-05	2.1e-06	2.9e-07	1.2e-06	3.9e-06	6.0e-06
Bk-249	1.0e-03	1.4e-04	6.0e-04	1.9e-03	3.0e-03	2.0e-04	2.9e-05	1.2e-04	3.9e-04	5.9e-04
Cf-248	1.4e-05	2.0e-06	8.1e-06	2.6e-05	4.1e-05	2.7e-06	3.9e-07	1.6e-06	5.3e-06	8.1e-06
Cf-249	4.2e-01	5.9e-02	2.4e-01	7.8e-01	1.2e+00	8.2e-02	1.2e-02	4.8e-02	1.6e-01	2.4e-01
Cf-250	1.2e-05	1.7e-06	7.1e-06	2.3e-05	3.6e-05	2.4e-06	3.4e-07	1.4e-06	4.5e-06	7.0e-06
Cf-251	1.0e-01	1.5e-02	6.1e-02	2.0e-01	3.1e-01	2.0e-02	2.9e-03	1.2e-02	3.9e-02	6.0e-02
Cf-252	1.9e-05	2.7e-06	1.1e-05	3.6e-05	5.6e-05	3.7e-06	5.4e-07	2.2e-06	7.2e-06	1.1e-05
Cf-254	7.1e-01	7.5e-02	3.7e-01	1.5e+00	2.3e+00	1.4e-01	1.5e-02	7.3e-02	2.9e-01	4.5e-01
Es-254	5.2e-01	7.3e-02	3.0e-01	9.8e-01	1.5e+00	1.0e-01	1.5e-02	6.0e-02	2.0e-01	3.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.35 Normalized effective dose equivalents from all pathways: Driving on slag road

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.4e+00	2.2e-01	1.6e+00	2.1e+00	2.2e+00	2.8e-01	4.4e-02	3.2e-01	4.0e-01	4.2e-01
P-32	4.6e-10	4.3e-18	4.9e-11	1.4e-09	2.3e-09	9.1e-11	9.2e-19	9.6e-12	2.6e-10	4.6e-10
S-35	1.1e-07	2.7e-09	1.2e-07	2.2e-07	2.5e-07	2.3e-08	5.2e-10	2.3e-08	4.3e-08	4.8e-08
Cl-36	1.7e-04	2.2e-05	1.5e-04	3.2e-04	3.7e-04	3.3e-05	4.3e-06	3.0e-05	6.3e-05	7.2e-05
K-40	1.6e-01	2.8e-02	1.7e-01	2.3e-01	2.4e-01	3.1e-02	5.5e-03	3.4e-02	4.3e-02	4.6e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.4e-06	1.7e-07	2.7e-06	4.1e-06	4.3e-06	4.8e-07	3.4e-08	5.4e-07	7.8e-07	8.3e-07
Sc-46	9.6e-02	2.0e-03	9.6e-02	1.9e-01	2.1e-01	1.9e-02	4.0e-04	1.9e-02	3.6e-02	4.0e-02
Cr-51	1.9e-06	8.1e-11	7.7e-07	5.2e-06	7.7e-06	3.7e-07	1.7e-11	1.5e-07	1.0e-06	1.5e-06
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.5e-01	5.2e-02	5.1e-01	6.9e-01	7.3e-01	8.9e-02	1.0e-02	1.0e-01	1.3e-01	1.4e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.2e-04	1.7e-07	8.6e-05	2.9e-04	3.7e-04	2.4e-05	3.5e-08	1.7e-05	5.8e-05	7.3e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	9.2e-03	9.0e-05	8.4e-03	1.9e-02	2.2e-02	1.8e-03	1.7e-05	1.7e-03	3.8e-03	4.3e-03
Sr-89	9.7e-06	3.3e-08	7.9e-06	2.2e-05	2.6e-05	1.9e-06	6.6e-09	1.6e-06	4.3e-06	5.1e-06
Sr-90	6.7e-03	1.2e-03	7.5e-03	9.5e-03	9.7e-03	1.3e-03	2.4e-04	1.5e-03	1.8e-03	1.9e-03
Y-91	6.6e-05	4.3e-07	5.8e-05	1.4e-04	1.7e-04	1.3e-05	8.7e-08	1.2e-05	2.8e-05	3.2e-05
Zr-93	2.0e-05	3.7e-06	2.3e-05	2.9e-05	2.9e-05	4.0e-06	7.3e-07	4.6e-06	5.5e-06	5.8e-06
Zr-95	4.2e-02	4.1e-04	3.9e-02	8.8e-02	1.0e-01	8.3e-03	8.0e-05	7.7e-03	1.7e-02	1.9e-02
Nb-93m	2.8e-05	5.0e-06	3.1e-05	3.9e-05	4.0e-05	5.5e-06	9.8e-07	6.3e-06	7.5e-06	7.8e-06
Nb-94	2.7e+00	5.0e-01	3.1e+00	3.8e+00	4.0e+00	5.4e-01	9.8e-02	6.2e-01	7.4e-01	7.8e-01
Nb-95	6.9e-04	2.8e-07	4.3e-04	1.8e-03	2.2e-03	1.4e-04	5.7e-08	8.4e-05	3.5e-04	4.5e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	8.3e-04	4.5e-06	8.1e-04	2.0e-03	2.5e-03	1.6e-04	9.0e-07	1.2e-04	3.9e-04	4.8e-04
Sb-125	1.5e-02	1.8e-03	1.4e-02	2.8e-02	3.2e-02	2.9e-03	3.5e-04	2.7e-03	5.5e-03	6.3e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	9.4e-06	6.0e-08	6.8e-06	2.2e-05	2.8e-05	1.8e-06	1.2e-08	1.3e-06	4.4e-06	5.6e-06
I-129	9.1e-04	1.1e-04	8.2e-04	1.7e-03	2.0e-03	1.8e-04	2.2e-05	1.6e-04	3.4e-04	3.9e-04
I-131	2.7e-12	8.5e-27	1.3e-14	4.3e-12	1.2e-11	5.3e-13	1.6e-27	2.5e-15	8.4e-13	2.4e-12
Cs-134	4.2e-02	4.8e-03	3.8e-02	8.2e-02	9.4e-02	8.3e-03	9.4e-04	7.6e-03	1.6e-02	1.8e-02
Cs-135	2.7e-07	3.6e-08	2.4e-07	5.2e-07	5.9e-07	5.3e-08	7.2e-09	4.8e-08	1.0e-07	1.2e-07
Cs-137	2.3e-02	3.1e-03	2.1e-02	4.5e-02	5.1e-02	4.6e-03	6.1e-04	4.2e-03	8.7e-03	1.0e-02
Ba-133	5.1e-01	9.0e-02	5.7e-01	7.2e-01	7.4e-01	1.0e-01	1.8e-02	1.2e-01	1.4e-01	1.5e-01
Ce-139	1.8e-02	9.9e-04	1.9e-02	3.1e-02	3.3e-02	3.5e-03	2.0e-04	3.9e-03	5.9e-03	6.3e-03
Ce-141	2.9e-05	8.9e-09	1.7e-05	7.8e-05	9.9e-05	5.8e-06	1.4e-09	3.4e-06	1.5e-05	2.0e-05
Ce-144	2.8e-02	3.1e-03	3.2e-02	4.3e-02	4.5e-02	5.5e-03	6.1e-04	6.5e-03	8.2e-03	8.6e-03
Pm-147	9.9e-06	1.6e-06	1.1e-05	1.4e-05	1.5e-05	1.9e-06	3.1e-07	2.3e-06	2.7e-06	2.8e-06

Table F1.35 Normalized effective dose equivalents from all pathways: Driving on slag road

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.8e-07	5.0e-08	3.1e-07	3.9e-07	4.0e-07	5.4e-08	9.8e-09	6.2e-08	7.5e-08	7.8e-08
Eu-152	1.8e+00	3.3e-01	2.1e+00	2.6e+00	2.7e+00	3.6e-01	6.5e-02	4.2e-01	5.0e-01	5.2e-01
Eu-154	1.9e+00	3.4e-01	2.2e+00	2.7e+00	2.8e+00	3.8e-01	6.8e-02	4.4e-01	5.3e-01	5.5e-01
Eu-155	4.2e-02	7.3e-03	4.8e-02	6.0e-02	6.2e-02	8.4e-03	1.4e-03	9.7e-03	1.2e-02	1.2e-02
Gd-153	1.8e-02	1.8e-03	2.0e-02	2.8e-02	2.9e-02	3.5e-03	3.5e-04	4.0e-03	5.3e-03	5.6e-03
Tb-160	3.2e-02	4.5e-04	3.0e-02	6.5e-02	7.3e-02	6.3e-03	8.7e-05	6.0e-03	1.3e-02	1.4e-02
Tm-170	3.6e-04	1.8e-05	3.9e-04	6.3e-04	6.8e-04	7.1e-05	3.6e-06	7.7e-05	1.2e-04	1.3e-04
Tm-171	1.9e-04	3.0e-05	2.2e-04	2.8e-04	2.9e-04	3.8e-05	5.8e-06	4.5e-05	5.4e-05	5.6e-05
Ta-182	1.5e-01	6.2e-03	1.6e-01	2.6e-01	2.9e-01	2.9e-02	1.2e-03	3.1e-02	5.0e-02	5.5e-02
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.2e+00	5.7e-01	3.5e+00	4.4e+00	4.6e+00	6.2e-01	1.1e-01	7.2e-01	8.5e-01	9.0e-01
Ra-228	2.7e+00	4.9e-01	3.0e+00	3.8e+00	3.9e+00	5.4e-01	9.9e-02	6.2e-01	7.4e-01	7.7e-01
Ac-227	5.4e-01	9.7e-02	6.1e-01	7.7e-01	7.9e-01	1.1e-01	1.9e-02	1.2e-01	1.5e-01	1.5e-01
Th-228	1.8e+00	2.7e-01	2.0e+00	2.5e+00	2.6e+00	3.5e-01	5.3e-02	4.1e-01	4.9e-01	5.1e-01
Th-229	4.5e-01	8.1e-02	5.0e-01	6.3e-01	6.5e-01	8.8e-02	1.6e-02	1.0e-01	1.2e-01	1.3e-01
Th-230	4.2e-02	7.6e-03	4.7e-02	5.8e-02	6.0e-02	8.2e-03	1.5e-03	9.4e-03	1.1e-02	1.2e-02
Th-232	4.4e+00	8.0e-01	4.9e+00	6.2e+00	6.4e+00	8.7e-01	1.6e-01	1.0e+00	1.2e+00	1.3e+00
Pa-231	4.1e-01	7.4e-02	4.5e-01	5.7e-01	5.9e-01	8.0e-02	1.5e-02	9.2e-02	1.1e-01	1.2e-01
U-232	2.6e+00	4.7e-01	2.9e+00	3.6e+00	3.8e+00	5.1e-01	9.4e-02	5.9e-01	7.0e-01	7.4e-01
U-233	1.7e-03	3.0e-04	1.9e-03	2.4e-03	2.4e-03	3.3e-04	6.1e-05	3.8e-04	4.5e-04	4.8e-04
U-234	1.2e-04	2.2e-05	1.3e-04	1.7e-04	1.7e-04	2.4e-05	4.3e-06	2.7e-05	3.2e-05	3.4e-05
U-235	2.1e-01	3.9e-02	2.4e-01	3.0e-01	3.1e-01	4.2e-02	7.7e-03	4.9e-02	5.8e-02	6.1e-02
U-236	6.1e-05	1.1e-05	6.8e-05	8.5e-05	8.8e-05	1.2e-05	2.2e-06	1.4e-05	1.6e-05	1.7e-05
U-238	3.7e-02	6.7e-03	4.2e-02	5.2e-02	5.4e-02	7.4e-03	1.3e-03	8.5e-03	1.0e-02	1.1e-02
Np-237	3.1e-01	5.8e-02	3.5e-01	4.3e-01	4.5e-01	6.1e-02	1.1e-02	7.0e-02	8.4e-02	8.8e-02
Pu-236	1.0e-01	1.9e-02	1.1e-01	1.4e-01	1.5e-01	2.0e-02	3.7e-03	2.3e-02	2.8e-02	2.9e-02
Pu-238	4.2e-05	7.7e-06	4.7e-05	5.9e-05	6.1e-05	8.3e-06	1.5e-06	9.6e-06	1.1e-05	1.2e-05
Pu-239	8.3e-05	1.5e-05	9.3e-05	1.2e-04	1.2e-04	1.6e-05	3.0e-06	1.9e-05	2.3e-05	2.4e-05
Pu-240	4.1e-05	7.5e-06	4.6e-05	5.8e-05	6.0e-05	8.2e-06	1.5e-06	9.4e-06	1.1e-05	1.2e-05
Pu-241	3.1e-04	5.6e-05	3.4e-04	4.3e-04	4.4e-04	6.0e-05	1.1e-05	6.9e-05	8.3e-05	8.7e-05
Pu-242	3.6e-05	6.6e-06	4.0e-05	5.1e-05	5.2e-05	7.1e-06	1.3e-06	8.2e-06	9.8e-06	1.0e-05
Pu-244	5.7e-01	1.0e-01	6.4e-01	8.0e-01	8.3e-01	1.1e-01	2.1e-02	1.3e-01	1.6e-01	1.6e-01
Am-241	1.2e-02	2.2e-03	1.4e-02	1.7e-02	1.8e-02	2.4e-03	4.4e-04	2.8e-03	3.3e-03	3.5e-03
Am-242m	1.9e-02	3.4e-03	2.1e-02	2.6e-02	2.7e-02	3.7e-03	6.8e-04	4.3e-03	5.1e-03	5.4e-03
Am-243	2.5e-01	4.5e-02	2.8e-01	3.5e-01	3.6e-01	5.0e-02	9.1e-03	5.7e-02	6.8e-02	7.2e-02
Cm-242	6.6e-06	5.1e-07	7.6e-06	1.1e-05	1.2e-05	1.3e-06	1.0e-07	1.5e-06	2.2e-06	2.3e-06
Cm-243	1.6e-01	2.9e-02	1.8e-01	2.2e-01	2.3e-01	3.1e-02	5.7e-03	3.6e-02	4.3e-02	4.5e-02
Cm-244	3.4e-05	6.1e-06	3.8e-05	4.8e-05	4.9e-05	6.6e-06	1.2e-06	7.7e-06	9.1e-06	9.5e-06
Cm-245	9.6e-02	1.8e-02	1.1e-01	1.3e-01	1.4e-01	1.9e-02	3.4e-03	2.2e-02	2.6e-02	2.7e-02
Cm-246	3.3e-05	6.0e-06	3.7e-05	4.6e-05	4.7e-05	6.5e-06	1.2e-06	7.4e-06	8.9e-06	9.3e-06
Cm-247	5.3e-01	9.6e-02	5.9e-01	7.4e-01	7.6e-01	1.0e-01	1.9e-02	1.2e-01	1.4e-01	1.5e-01
Cm-248	2.5e-05	4.5e-06	2.8e-05	3.5e-05	3.6e-05	4.9e-06	8.9e-07	5.6e-06	6.7e-06	7.0e-06
Bk-249	1.3e-03	2.3e-04	1.4e-03	1.8e-03	1.9e-03	2.5e-04	4.6e-05	2.9e-04	3.5e-04	3.7e-04
Cf-248	1.4e-05	1.8e-06	1.6e-05	2.1e-05	2.2e-05	2.7e-06	3.6e-07	3.2e-06	4.0e-06	4.2e-06
Cf-249	5.2e-01	9.4e-02	5.8e-01	7.3e-01	7.5e-01	1.0e-01	1.9e-02	1.2e-01	1.4e-01	1.5e-01
Cf-250	3.1e-05	5.5e-06	3.5e-05	4.4e-05	4.5e-05	6.1e-06	1.1e-06	7.1e-06	8.4e-06	8.8e-06
Cf-251	1.5e-01	2.7e-02	1.7e-01	2.1e-01	2.1e-01	2.9e-02	5.3e-03	3.4e-02	4.0e-02	4.2e-02
Cf-252	3.5e-05	5.7e-06	3.9e-05	5.0e-05	5.1e-05	6.8e-06	1.1e-06	8.0e-06	9.5e-06	9.9e-06
Cf-254	9.1e-10	6.9e-12	8.1e-10	1.9e-09	2.2e-09	1.8e-10	1.3e-12	1.6e-10	3.8e-10	4.4e-10
Es-254	4.7e-01	5.1e-02	5.3e-01	7.2e-01	7.6e-01	9.2e-02	1.0e-02	1.1e-01	1.4e-01	1.5e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.36 Normalized effective dose equivalents from all pathways: Sailor operations

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	8.8e-07	1.1e-07	5.2e-07	1.8e-06	2.8e-06	1.7e-07	2.2e-08	1.0e-07	3.5e-07	5.5e-07
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	3.0e-16	3.4e-17	1.4e-16	6.1e-16	9.9e-16	5.9e-17	6.8e-18	2.8e-17	1.2e-16	1.9e-16
S-35	2.6e-10	1.2e-10	4.5e-10	1.5e-09	2.3e-09	1.5e-10	2.4e-11	8.8e-11	2.9e-10	4.6e-10
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	6.2e-09	9.0e-10	3.4e-09	1.2e-08	1.9e-08	1.2e-09	1.8e-10	6.8e-10	2.4e-09	3.7e-09
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-01	1.4e-02	6.6e-02	2.3e-01	3.6e-01	2.3e-02	2.9e-03	1.3e-02	4.6e-02	7.1e-02
Fe-55	9.0e-11	1.2e-11	5.3e-11	1.6e-10	2.9e-10	1.8e-11	2.4e-12	1.1e-11	3.3e-11	6.2e-11
Fe-59	2.1e-04	3.1e-05	1.2e-04	4.0e-04	6.4e-04	4.2e-05	6.1e-06	2.5e-05	7.9e-05	1.3e-04
Co-56	5.7e-02	8.0e-03	3.4e-02	1.1e-01	1.8e-01	1.1e-02	1.6e-03	6.7e-03	2.1e-02	3.7e-02
Co-57	1.7e-02	2.4e-03	1.0e-02	3.2e-02	5.7e-02	3.4e-03	4.8e-04	2.1e-03	6.3e-03	1.2e-02
Co-58	6.7e-03	9.5e-04	4.0e-03	1.3e-02	2.1e-02	1.3e-03	1.9e-04	7.9e-04	2.5e-03	4.3e-03
Co-60	1.6e+01	2.2e+00	9.5e+00	2.9e+01	5.2e+01	3.1e+00	4.3e-01	1.9e+00	5.8e+00	1.1e+01
Ni-59	9.8e-05	1.3e-05	5.8e-05	1.8e-04	3.2e-04	1.9e-05	2.6e-06	1.1e-05	3.6e-05	6.8e-05
Ni-63	1.1e-08	1.5e-09	6.7e-09	2.1e-08	3.7e-08	2.2e-09	3.0e-10	1.3e-09	4.1e-09	7.7e-09
Zn-65	4.2e-02	4.7e-03	2.4e-02	8.4e-02	1.3e-01	8.3e-03	9.4e-04	4.7e-03	1.7e-02	2.5e-02
As-73	1.8e-07	2.6e-08	1.0e-07	3.4e-07	5.4e-07	3.5e-08	5.1e-09	2.1e-08	6.6e-08	1.1e-07
Se-75	7.6e-04	1.2e-04	4.5e-04	1.5e-03	2.3e-03	1.5e-04	2.4e-05	8.8e-05	2.9e-04	4.5e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	8.5e-06	8.7e-07	3.8e-06	1.2e-05	2.1e-05	1.3e-06	1.7e-07	7.6e-07	2.4e-06	4.4e-06
Tc-97	7.6e-06	1.0e-06	4.5e-06	1.4e-05	2.5e-05	1.5e-06	2.0e-07	8.9e-07	2.8e-06	5.2e-06
Tc-97m	3.6e-07	5.1e-08	2.2e-07	6.8e-07	1.2e-06	7.1e-08	1.0e-08	4.3e-08	1.3e-07	2.3e-07
Tc-99	5.7e-05	7.7e-06	3.4e-05	1.0e-04	1.9e-04	1.1e-05	1.5e-06	6.7e-06	2.1e-05	3.9e-05
Ru-103	1.8e-05	2.6e-06	1.1e-05	3.4e-05	5.4e-05	3.5e-06	5.2e-07	2.1e-06	6.8e-06	1.1e-05
Ru-106	3.8e-01	5.2e-02	2.3e-01	7.0e-01	1.2e+00	7.5e-02	1.0e-02	4.5e-02	1.4e-01	2.6e-01
Ag-108m	9.0e+00	1.2e+00	5.3e+00	1.7e+01	2.9e+01	1.8e+00	2.5e-01	1.1e+00	3.3e+00	6.1e+00
Ag-110m	2.2e+00	3.1e-01	1.3e+00	4.2e+00	7.2e+00	4.4e-01	6.2e-02	2.6e-01	8.2e-01	1.5e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	1.7e-02	2.4e-03	1.0e-02	3.3e-02	5.7e-02	3.4e-03	4.8e-04	2.1e-03	6.4e-03	1.2e-02
Sb-124	3.9e-03	5.7e-04	2.3e-03	7.4e-03	1.2e-02	7.7e-04	1.1e-04	4.6e-04	1.4e-03	2.4e-03
Sb-125	1.3e+00	1.8e-01	7.7e-01	2.4e+00	4.2e+00	2.6e-01	3.6e-02	1.5e-01	4.8e-01	8.9e-01
Te-123m	1.4e-04	2.2e-05	8.1e-05	2.7e-04	4.2e-04	2.8e-05	4.4e-06	1.6e-05	5.3e-05	8.5e-05
Te-127m	1.1e-05	1.7e-06	6.2e-06	2.1e-05	3.2e-05	2.1e-06	3.4e-07	1.2e-06	4.1e-06	6.6e-06
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.36 Normalized effective dose equivalents from all pathways: Sailor operations

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	2.0e-05	2.7e-06	1.2e-05	3.6e-05	6.3e-05	3.8e-06	5.4e-07	2.3e-06	7.2e-06	1.3e-05
W-185	3.0e-07	4.3e-08	1.8e-07	5.8e-07	9.7e-07	6.0e-08	8.6e-09	3.6e-08	1.1e-07	1.9e-07
Os-185	8.8e-04	1.3e-04	4.9e-04	1.6e-03	2.5e-03	1.7e-04	2.7e-05	9.8e-05	3.2e-04	5.0e-04
Ir-192	5.5e-03	7.8e-04	3.3e-03	1.0e-02	1.7e-02	1.1e-03	1.6e-04	6.5e-04	2.0e-03	3.5e-03
Tl-204	4.9e-05	7.3e-06	2.9e-05	9.6e-05	1.5e-04	9.6e-06	1.5e-06	5.7e-06	1.9e-05	2.9e-05
Pb-210	2.4e-04	3.6e-05	1.4e-04	4.5e-04	7.3e-04	4.7e-05	7.1e-06	2.8e-05	8.9e-05	1.5e-04
Bi-207	4.1e-01	6.2e-02	2.4e-01	7.8e-01	1.3e+00	8.2e-02	1.3e-02	4.7e-02	1.6e-01	2.5e-01
Po-210	7.1e-08	1.1e-08	4.2e-08	1.4e-07	2.2e-07	1.4e-08	2.2e-09	8.2e-09	2.6e-08	4.2e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.37 Normalized effective dose equivalents from all pathways: Sailor deck duty

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	8.7e-06	8.6e-07	3.9e-06	1.3e-05	2.1e-05	1.3e-06	1.7e-07	7.7e-07	2.6e-06	4.2e-06
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	4.8e-16	5.5e-17	2.3e-16	9.8e-16	1.6e-15	9.4e-17	1.1e-17	4.5e-17	1.9e-16	3.1e-16
S-35	5.3e-09	8.1e-10	3.1e-09	1.0e-08	1.6e-08	1.0e-09	1.6e-10	6.1e-10	2.0e-09	3.1e-09
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	9.5e-09	1.4e-09	5.2e-09	1.8e-08	2.9e-08	1.9e-09	2.7e-10	1.0e-09	3.7e-09	5.6e-09
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.8e-01	1.9e-02	8.8e-02	3.1e-01	4.8e-01	3.1e-02	3.9e-03	1.7e-02	6.1e-02	9.5e-02
Fe-55	2.2e-10	3.0e-11	1.3e-10	4.0e-10	7.3e-10	4.3e-11	6.0e-12	2.6e-11	8.0e-11	1.5e-10
Fe-59	2.7e-04	3.9e-05	1.6e-04	5.1e-04	8.2e-04	5.3e-05	7.8e-06	3.2e-05	1.0e-04	1.6e-04
Co-56	7.1e-02	1.0e-02	4.2e-02	1.3e-01	2.2e-01	1.4e-02	2.0e-03	8.3e-03	2.6e-02	4.6e-02
Co-57	4.2e-02	5.9e-03	2.5e-02	7.8e-02	1.4e-01	8.4e-03	1.2e-03	5.0e-03	1.5e-02	2.9e-02
Co-58	9.1e-03	1.3e-03	5.4e-03	1.7e-02	2.9e-02	1.8e-03	2.6e-04	1.1e-03	3.4e-03	5.8e-03
Co-60	2.0e+01	2.7e+00	1.2e+01	3.7e+01	6.6e+01	4.0e+00	5.4e-01	2.4e+00	7.3e+00	1.4e+01
Ni-59	1.4e-04	1.9e-05	8.3e-05	2.6e-04	4.6e-04	2.8e-05	3.7e-06	1.6e-05	5.1e-05	9.7e-05
Ni-63	1.5e-07	2.1e-08	9.1e-08	2.8e-07	5.0e-07	3.0e-08	4.1e-09	1.8e-08	5.6e-08	1.1e-07
Zn-65	5.5e-02	8.0e-03	3.0e-02	1.1e-01	1.6e-01	1.1e-02	1.2e-03	6.0e-03	2.2e-02	3.2e-02
As-73	2.3e-06	3.4e-07	1.4e-06	4.4e-06	7.1e-06	4.6e-07	6.7e-08	2.7e-07	8.6e-07	1.4e-06
Se-75	1.3e-03	1.9e-04	7.3e-04	2.4e-03	3.7e-03	2.5e-04	3.9e-05	1.4e-04	4.7e-04	7.5e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	8.8e-05	1.2e-05	5.2e-05	1.6e-04	2.9e-04	1.7e-05	2.4e-06	1.0e-05	3.2e-05	5.1e-05
Tc-97	1.0e-04	1.4e-05	6.1e-05	1.9e-04	3.4e-04	2.0e-05	2.8e-06	1.2e-05	3.8e-05	7.1e-05
Tc-97m	1.7e-06	2.4e-07	1.0e-06	3.2e-06	5.5e-06	3.3e-07	4.8e-08	2.0e-07	6.2e-07	1.1e-06
Tc-99	1.8e-04	2.4e-05	1.1e-04	3.3e-04	5.9e-04	3.5e-05	4.8e-06	2.1e-05	6.5e-05	1.2e-04
Ru-103	2.6e-05	3.8e-06	1.5e-05	4.9e-05	7.7e-05	5.1e-06	7.4e-07	3.0e-06	9.7e-06	1.5e-05
Ru-106	5.3e-01	7.3e-02	3.2e-01	9.8e-01	1.7e+00	1.0e-01	1.4e-02	6.3e-02	1.9e-01	3.6e-01
Ag-108m	1.3e+01	1.7e+00	7.4e+00	2.3e+01	4.1e+01	2.5e+00	3.4e-01	1.5e+00	4.6e+00	8.5e+00
Ag-110m	3.0e+00	4.1e-01	1.7e+00	5.5e+00	9.5e+00	5.8e-01	8.2e-02	3.4e-01	1.1e+00	2.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	2.6e-02	3.6e-03	1.5e-02	4.8e-02	8.4e-02	5.1e-03	7.2e-04	3.0e-03	9.5e-03	1.7e-02
Sb-124	5.0e-03	7.3e-04	3.0e-03	9.4e-03	1.6e-02	9.9e-04	1.5e-04	5.9e-04	1.9e-03	3.1e-03
Sb-125	1.9e+00	2.6e-01	1.1e+00	3.5e+00	6.0e+00	3.7e-01	5.1e-02	2.2e-01	6.9e-01	1.3e+00
Te-123m	2.8e-04	4.4e-05	1.6e-04	5.4e-04	8.4e-04	5.5e-05	8.7e-06	3.2e-05	1.1e-04	1.7e-04
Te-127m	1.6e-05	2.6e-06	9.4e-06	3.1e-05	5.0e-05	3.2e-06	5.1e-07	1.9e-06	6.2e-06	1.0e-05
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.37 Normalized effective dose equivalents from all pathways: Sailor deck duty

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	2.2e-04	3.1e-05	1.3e-04	4.2e-04	7.2e-04	4.4e-05	6.2e-06	2.6e-05	8.2e-05	1.5e-04
W-185	7.7e-07	1.1e-07	4.6e-07	1.5e-06	2.4e-06	1.5e-07	2.2e-08	9.1e-08	2.8e-07	4.9e-07
Os-185	1.2e-03	1.9e-04	6.8e-04	2.2e-03	3.5e-03	2.3e-04	3.7e-05	1.4e-04	4.3e-04	6.9e-04
Ir-192	8.2e-03	1.2e-03	4.9e-03	1.5e-02	2.6e-02	1.6e-03	2.3e-04	9.6e-04	3.0e-03	5.2e-03
Tl-204	1.1e-04	1.6e-05	6.4e-05	2.1e-04	3.3e-04	2.1e-05	3.2e-06	1.3e-05	4.2e-05	6.5e-05
Pb-210	4.3e-04	6.5e-05	2.5e-04	8.1e-04	1.3e-03	8.5e-05	1.3e-05	5.0e-05	1.6e-04	2.6e-04
Bi-207	5.5e-01	8.3e-02	3.2e-01	1.0e+00	1.7e+00	1.1e-01	1.7e-02	6.3e-02	2.1e-01	3.3e-01
Po-210	9.5e-08	1.5e-08	5.6e-08	1.8e-07	2.9e-07	1.9e-08	3.0e-09	1.1e-08	3.5e-08	5.7e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.38 Normalized effective dose equivalents from all pathways: Scrap truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.3e-07	8.2e-08	1.3e-07	1.8e-07	1.9e-07	2.6e-08	1.7e-08	2.6e-08	3.5e-08	3.8e-08
Na-22	2.2e+00	1.3e+00	2.1e+00	2.9e+00	3.2e+00	4.2e-01	2.7e-01	4.2e-01	5.7e-01	6.1e-01
P-32	3.2e-03	2.0e-03	3.2e-03	4.4e-03	4.8e-03	6.4e-04	4.1e-04	6.2e-04	8.6e-04	9.3e-04
S-35	1.5e-07	9.4e-08	1.5e-07	2.1e-07	2.2e-07	3.0e-08	1.9e-08	2.9e-08	4.0e-08	4.3e-08
Cl-36	4.3e-04	2.6e-04	4.2e-04	5.8e-04	6.3e-04	8.4e-05	5.4e-05	8.3e-05	1.1e-04	1.2e-04
K-40	1.7e-01	1.1e-01	1.7e-01	2.3e-01	2.5e-01	3.4e-02	2.2e-02	3.3e-02	4.5e-02	4.9e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.9e-06	1.8e-06	2.8e-06	3.9e-06	4.2e-06	5.6e-07	3.6e-07	5.5e-07	7.5e-07	8.1e-07
Sc-46	2.0e+00	1.2e+00	2.0e+00	2.7e+00	3.0e+00	4.0e-01	2.6e-01	3.9e-01	5.3e-01	5.7e-01
Cr-51	2.0e-02	1.2e-02	2.0e-02	2.7e-02	3.0e-02	4.0e-03	2.6e-03	3.9e-03	5.3e-03	5.7e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.3e-01	5.1e-01	8.1e-01	1.1e+00	1.2e+00	1.6e-01	1.1e-01	1.6e-01	2.2e-01	2.4e-01
Fe-55	1.8e-11	1.1e-11	1.7e-11	2.4e-11	2.6e-11	3.5e-12	2.2e-12	3.4e-12	4.6e-12	5.0e-12
Fe-59	1.2e+00	7.3e-01	1.2e+00	1.6e+00	1.7e+00	2.3e-01	1.5e-01	2.3e-01	3.1e-01	3.4e-01
Co-56	3.6e+00	2.2e+00	3.5e+00	4.9e+00	5.3e+00	7.1e-01	4.6e-01	7.0e-01	9.5e-01	1.0e+00
Co-57	1.3e-02	8.1e-03	1.3e-02	1.8e-02	1.9e-02	2.6e-03	1.7e-03	2.5e-03	3.5e-03	3.7e-03
Co-58	9.2e-01	5.7e-01	9.0e-01	1.2e+00	1.3e+00	1.8e-01	1.2e-01	1.8e-01	2.4e-01	2.6e-01
Co-60	2.7e+00	1.7e+00	2.6e+00	3.6e+00	3.9e+00	5.3e-01	3.4e-01	5.2e-01	7.0e-01	7.6e-01
Ni-59	1.4e-05	8.6e-06	1.4e-05	1.9e-05	2.0e-05	2.7e-06	1.8e-06	2.7e-06	3.7e-06	3.9e-06
Ni-63	3.1e-12	1.9e-12	3.0e-12	4.2e-12	4.5e-12	6.1e-13	3.9e-13	5.9e-13	8.1e-13	8.7e-13
Zn-65	6.0e-01	3.7e-01	5.9e-01	8.2e-01	8.8e-01	1.2e-01	7.6e-02	1.2e-01	1.6e-01	1.7e-01
As-73	5.2e-07	3.2e-07	5.1e-07	7.1e-07	7.6e-07	1.0e-07	6.6e-08	1.0e-07	1.4e-07	1.5e-07
Se-75	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.7e-01	3.6e-02	2.3e-02	3.6e-02	4.8e-02	5.2e-02
Sr-85	4.1e-01	2.5e-01	4.0e-01	5.6e-01	6.0e-01	8.0e-02	5.2e-02	7.9e-02	1.1e-01	1.2e-01
Sr-89	1.3e-02	8.0e-03	1.3e-02	1.8e-02	1.9e-02	2.5e-03	1.6e-03	2.5e-03	3.4e-03	3.6e-03
Sr-90	8.6e-03	5.3e-03	8.4e-03	1.2e-02	1.3e-02	1.7e-03	1.1e-03	1.7e-03	2.3e-03	2.5e-03
Y-91	6.9e-03	4.3e-03	6.7e-03	9.3e-03	1.0e-02	1.4e-03	8.7e-04	1.3e-03	1.8e-03	1.9e-03
Zr-93	1.0e-11	6.3e-12	1.0e-11	1.4e-11	1.5e-11	2.0e-12	1.3e-12	2.0e-12	2.7e-12	2.9e-12
Zr-95	7.5e-01	4.6e-01	7.3e-01	1.0e+00	1.1e+00	1.5e-01	9.5e-02	1.4e-01	2.0e-01	2.1e-01
Nb-93m	3.8e-16	2.3e-16	3.7e-16	5.1e-16	5.5e-16	7.5e-17	4.8e-17	7.3e-17	9.9e-17	1.1e-16
Nb-94	1.6e+00	9.6e-01	1.5e+00	2.1e+00	2.3e+00	3.1e-01	2.0e-01	3.0e-01	4.1e-01	4.4e-01
Nb-95	7.0e-01	4.3e-01	6.8e-01	9.5e-01	1.0e+00	1.4e-01	8.9e-02	1.3e-01	1.8e-01	2.0e-01
Mo-93	1.6e-19	7.2e-20	1.5e-19	2.4e-19	2.7e-19	3.1e-20	1.5e-20	2.9e-20	4.7e-20	5.3e-20
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	7.4e-06	4.6e-06	7.2e-06	1.0e-05	1.1e-05	1.5e-06	9.4e-07	1.4e-06	1.9e-06	2.1e-06
Tc-99	7.6e-06	4.7e-06	7.4e-06	1.0e-05	1.1e-05	1.5e-06	9.6e-07	1.5e-06	2.0e-06	2.1e-06
Ru-103	4.0e-01	2.5e-01	3.9e-01	5.4e-01	5.8e-01	7.8e-02	5.0e-02	7.6e-02	1.0e-01	1.1e-01
Ru-106	2.1e-01	1.3e-01	2.1e-01	2.9e-01	3.1e-01	4.2e-02	2.7e-02	4.1e-02	5.6e-02	6.0e-02
Ag-108m	1.5e+00	9.1e-01	1.4e+00	2.0e+00	2.2e+00	2.9e-01	1.9e-01	2.9e-01	3.9e-01	4.2e-01
Ag-110m	2.7e+00	1.7e+00	2.7e+00	3.7e+00	4.0e+00	5.4e-01	3.5e-01	5.2e-01	7.2e-01	7.7e-01
Cd-109	3.9e-05	2.4e-05	3.8e-05	5.3e-05	5.7e-05	7.7e-06	5.0e-06	7.5e-06	1.0e-05	1.1e-05
Sn-113	2.0e-01	1.2e-01	1.9e-01	2.7e-01	2.9e-01	3.9e-02	2.5e-02	3.8e-02	5.2e-02	5.6e-02
Sb-124	1.8e+00	1.1e+00	1.8e+00	2.5e+00	2.7e+00	3.6e-01	2.3e-01	3.5e-01	4.8e-01	5.2e-01
Sb-125	3.6e-01	2.2e-01	3.5e-01	4.9e-01	5.3e-01	7.1e-02	4.6e-02	7.0e-02	9.5e-02	1.0e-01
Te-123m	3.1e-02	1.9e-02	3.0e-02	4.2e-02	4.5e-02	6.1e-03	3.9e-03	6.0e-03	8.2e-03	8.8e-03
Te-127m	3.9e-03	2.4e-03	3.8e-03	5.3e-03	5.7e-03	7.7e-04	4.9e-04	7.5e-04	1.0e-03	1.1e-03
I-125	3.8e-10	2.4e-10	3.7e-10	5.2e-10	5.6e-10	7.5e-11	4.8e-11	7.3e-11	1.0e-10	1.1e-10
I-129	8.0e-08	4.9e-08	7.8e-08	1.1e-07	1.2e-07	1.6e-08	1.0e-08	1.5e-08	2.1e-08	2.3e-08
I-131	2.1e-01	1.3e-01	2.1e-01	2.9e-01	3.2e-01	4.2e-02	2.6e-02	4.1e-02	5.7e-02	6.2e-02
Cs-134	1.5e+00	9.2e-01	1.5e+00	2.0e+00	2.2e+00	2.9e-01	1.9e-01	2.9e-01	3.9e-01	4.2e-01
Cs-135	4.8e-06	2.9e-06	4.7e-06	6.5e-06	7.0e-06	9.4e-07	6.1e-07	9.2e-07	1.3e-06	1.4e-06
Cs-137	5.4e-01	3.3e-01	5.2e-01	7.3e-01	7.8e-01	1.1e-01	6.8e-02	1.0e-01	1.4e-01	1.5e-01
Ba-133	2.4e-01	1.5e-01	2.4e-01	3.3e-01	3.6e-01	4.8e-02	3.1e-02	4.7e-02	6.4e-02	6.9e-02
Ce-139	3.4e-02	2.1e-02	3.3e-02	4.6e-02	5.0e-02	6.7e-03	4.3e-03	6.5e-03	8.9e-03	9.6e-03
Ce-141	1.2e-02	7.4e-03	1.2e-02	1.6e-02	1.8e-02	2.4e-03	1.5e-03	2.3e-03	3.2e-03	3.4e-03
Ce-144	4.7e-02	2.9e-02	4.6e-02	6.4e-02	6.9e-02	9.3e-03	6.0e-03	9.1e-03	1.2e-02	1.3e-02
Pm-147	1.3e-06	8.0e-07	1.3e-06	1.8e-06	1.9e-06	2.6e-07	1.7e-07	2.5e-07	3.4e-07	3.7e-07

Table F1.38 Normalized effective dose equivalents from all pathways: Scrap truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.9e-11	1.2e-11	1.8e-11	2.5e-11	2.7e-11	3.7e-12	2.4e-12	3.6e-12	4.9e-12	5.3e-12
Eu-152	1.1e+00	6.9e-01	1.1e+00	1.5e+00	1.6e+00	2.2e-01	1.4e-01	2.1e-01	2.9e-01	3.2e-01
Eu-154	1.1e+00	6.8e-01	1.1e+00	1.5e+00	1.6e+00	2.2e-01	1.4e-01	2.1e-01	2.9e-01	3.1e-01
Eu-155	1.3e-03	8.0e-04	1.3e-03	1.8e-03	1.9e-03	2.5e-04	1.6e-04	2.5e-04	3.4e-04	3.7e-04
Gd-153	1.7e-03	1.0e-03	1.6e-03	2.3e-03	2.4e-03	3.3e-04	2.1e-04	3.2e-04	4.4e-04	4.7e-04
Tb-160	1.1e+00	6.6e-01	1.0e+00	1.4e+00	1.6e+00	2.1e-01	1.3e-01	2.0e-01	2.8e-01	3.0e-01
Tm-170	5.9e-04	3.6e-04	5.7e-04	8.0e-04	8.6e-04	1.2e-04	7.5e-05	1.1e-04	1.5e-04	1.7e-04
Tm-171	1.6e-07	9.9e-08	1.6e-07	2.2e-07	2.4e-07	3.2e-08	2.0e-08	3.1e-08	4.2e-08	4.6e-08
Ta-182	1.2e+00	7.6e-01	1.2e+00	1.7e+00	1.8e+00	2.4e-01	1.6e-01	2.4e-01	3.2e-01	3.5e-01
W-181	2.2e-05	1.4e-05	2.2e-05	3.0e-05	3.2e-05	4.4e-06	2.8e-06	4.3e-06	5.8e-06	6.3e-06
W-185	3.0e-05	1.8e-05	2.9e-05	4.0e-05	4.3e-05	5.8e-06	3.7e-06	5.7e-06	7.8e-06	8.4e-06
Os-185	6.0e-01	3.7e-01	5.8e-01	8.1e-01	8.7e-01	1.2e-01	7.6e-02	1.2e-01	1.6e-01	1.7e-01
Ir-192	6.0e-01	3.7e-01	5.8e-01	8.1e-01	8.7e-01	1.2e-01	7.5e-02	1.1e-01	1.6e-01	1.7e-01
Tl-204	2.8e-04	1.7e-04	2.7e-04	3.8e-04	4.1e-04	5.5e-05	3.6e-05	5.4e-05	7.3e-05	7.9e-05
Pb-210	9.1e-04	5.6e-04	8.8e-04	1.2e-03	1.3e-03	1.8e-04	1.1e-04	1.7e-04	2.4e-04	2.6e-04
Bi-207	1.5e+00	9.1e-01	1.4e+00	2.0e+00	2.2e+00	2.9e-01	1.9e-01	2.8e-01	3.9e-01	4.2e-01
Po-210	9.5e-06	5.9e-06	9.3e-06	1.3e-05	1.4e-05	1.9e-06	1.2e-06	1.8e-06	2.5e-06	2.7e-06
Ra-226	1.7e+00	1.1e+00	1.7e+00	2.3e+00	2.5e+00	3.4e-01	2.2e-01	3.3e-01	4.5e-01	4.9e-01
Ra-228	8.5e-01	5.2e-01	8.3e-01	1.2e+00	1.2e+00	1.7e-01	1.1e-01	1.6e-01	2.2e-01	2.4e-01
Ac-227	2.5e-01	1.5e-01	2.4e-01	3.3e-01	3.6e-01	4.9e-02	3.1e-02	4.7e-02	6.5e-02	7.0e-02
Th-228	1.4e+00	8.8e-01	1.4e+00	1.9e+00	2.1e+00	2.8e-01	1.8e-01	2.8e-01	3.8e-01	4.0e-01
Th-229	1.7e-01	1.1e-01	1.7e-01	2.4e-01	2.6e-01	3.4e-02	2.2e-02	3.4e-02	4.6e-02	4.9e-02
Th-230	4.3e-05	2.7e-05	4.2e-05	5.9e-05	6.4e-05	8.6e-06	5.4e-06	8.4e-06	1.1e-05	1.2e-05
Th-232	1.1e-03	5.2e-04	1.1e-03	1.7e-03	1.9e-03	2.2e-04	1.1e-04	2.1e-04	3.4e-04	3.8e-04
Pa-231	2.0e-02	1.2e-02	2.0e-02	2.7e-02	2.9e-02	4.0e-03	2.6e-03	3.9e-03	5.3e-03	5.7e-03
U-232	5.7e-03	2.6e-03	5.4e-03	8.8e-03	9.9e-03	1.1e-03	5.3e-04	1.1e-03	1.7e-03	1.9e-03
U-233	7.0e-05	4.3e-05	6.8e-05	9.5e-05	1.0e-04	1.4e-05	8.8e-06	1.3e-05	1.8e-05	2.0e-05
U-234	4.9e-06	3.0e-06	4.8e-06	6.6e-06	7.1e-06	9.6e-07	6.2e-07	9.4e-07	1.3e-06	1.4e-06
U-235	4.8e-02	3.0e-02	4.7e-02	6.5e-02	7.0e-02	9.5e-03	6.1e-03	9.3e-03	1.3e-02	1.4e-02
U-236	1.5e-06	9.2e-07	1.5e-06	2.0e-06	2.2e-06	3.0e-07	1.9e-07	2.9e-07	3.9e-07	4.2e-07
U-238	2.5e-02	1.5e-02	2.4e-02	3.3e-02	3.6e-02	4.9e-03	3.1e-03	4.8e-03	6.5e-03	7.0e-03
Np-237	1.2e-01	7.6e-02	1.2e-01	1.7e-01	1.8e-01	2.4e-02	1.6e-02	2.4e-02	3.2e-02	3.5e-02
Pu-236	4.1e-06	2.5e-06	4.0e-06	5.6e-06	6.0e-06	8.0e-07	5.1e-07	7.9e-07	1.1e-06	1.2e-06
Pu-238	8.3e-07	5.1e-07	8.1e-07	1.1e-06	1.2e-06	1.6e-07	1.1e-07	1.6e-07	2.2e-07	2.4e-07
Pu-239	2.2e-05	1.3e-05	2.1e-05	2.9e-05	3.2e-05	4.3e-06	2.7e-06	4.2e-06	5.7e-06	6.1e-06
Pu-240	6.0e-07	3.7e-07	5.9e-07	8.2e-07	8.8e-07	1.2e-07	7.7e-08	1.2e-07	1.6e-07	1.7e-07
Pu-241	1.0e-07	6.2e-08	9.8e-08	1.4e-07	1.5e-07	2.0e-08	1.3e-08	1.9e-08	2.6e-08	2.9e-08
Pu-242	5.0e-07	3.1e-07	4.9e-07	6.8e-07	7.3e-07	9.9e-08	6.4e-08	9.7e-08	1.3e-07	1.4e-07
Pu-244	3.1e-01	1.9e-01	3.0e-01	4.1e-01	4.5e-01	6.0e-02	3.9e-02	5.9e-02	8.0e-02	8.6e-02
Am-241	1.7e-05	1.0e-05	1.6e-05	2.3e-05	2.4e-05	3.3e-06	2.1e-06	3.2e-06	4.4e-06	4.7e-06
Am-242m	3.8e-03	2.3e-03	3.7e-03	5.1e-03	5.5e-03	7.4e-04	4.8e-04	7.3e-04	9.9e-04	1.1e-03
Am-243	5.4e-02	3.4e-02	5.3e-02	7.4e-02	8.0e-02	1.1e-02	6.9e-03	1.1e-02	1.4e-02	1.5e-02
Cm-242	2.2e-06	1.3e-06	2.1e-06	3.0e-06	3.2e-06	4.3e-07	2.8e-07	4.2e-07	5.7e-07	6.2e-07
Cm-243	4.2e-02	2.6e-02	4.1e-02	5.7e-02	6.2e-02	8.3e-03	5.4e-03	8.2e-03	1.1e-02	1.2e-02
Cm-244	1.9e-06	1.2e-06	1.9e-06	2.6e-06	2.8e-06	3.8e-07	2.5e-07	3.8e-07	5.1e-07	5.5e-07
Cm-245	9.3e-03	5.7e-03	9.0e-03	1.3e-02	1.4e-02	1.8e-03	1.2e-03	1.8e-03	2.4e-03	2.6e-03
Cm-246	1.1e-10	6.6e-11	1.0e-10	1.4e-10	1.6e-10	2.1e-11	1.4e-11	2.1e-11	2.8e-11	3.0e-11
Cm-247	2.5e-01	1.5e-01	2.4e-01	3.4e-01	3.6e-01	4.9e-02	3.1e-02	4.8e-02	6.5e-02	7.0e-02
Cm-248	8.6e-11	5.3e-11	8.4e-11	1.2e-10	1.3e-10	1.7e-11	1.1e-11	1.7e-11	2.3e-11	2.4e-11
Bk-249	5.6e-06	2.7e-06	5.4e-06	8.6e-06	9.6e-06	1.1e-06	5.5e-07	1.1e-06	1.7e-06	1.9e-06
Cf-248	5.9e-07	3.7e-07	5.8e-07	8.0e-07	8.6e-07	1.2e-07	7.5e-08	1.1e-07	1.6e-07	1.7e-07
Cf-249	2.4e-01	1.5e-01	2.4e-01	3.3e-01	3.6e-01	4.8e-02	3.1e-02	4.7e-02	6.4e-02	6.9e-02
Cf-250	3.6e-11	2.2e-11	3.5e-11	4.9e-11	5.3e-11	7.1e-12	4.6e-12	6.9e-12	9.4e-12	1.0e-11
Cf-251	2.5e-02	1.6e-02	2.5e-02	3.4e-02	3.7e-02	5.0e-03	3.2e-03	4.9e-03	6.6e-03	7.1e-03
Cf-252	1.2e-06	7.3e-07	1.2e-06	1.6e-06	1.7e-06	2.3e-07	1.5e-07	2.3e-07	3.1e-07	3.4e-07
Cf-254	1.7e+01	1.1e+01	1.7e+01	2.3e+01	2.5e+01	3.4e+00	2.2e+00	3.3e+00	4.5e+00	4.8e+00
Es-254	9.2e-01	5.7e-01	9.0e-01	1.2e+00	1.3e+00	1.8e-01	1.2e-01	1.8e-01	2.4e-01	2.6e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.39 Normalized effective dose equivalents from all pathways: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+00	1.7e-01	7.4e-01	2.3e+00	3.1e+00	2.1e-01	3.3e-02	1.5e-01	4.5e-01	6.0e-01
P-32	1.0e-03	1.0e-04	5.3e-04	2.5e-03	3.6e-03	2.0e-04	2.0e-05	1.1e-04	4.9e-04	7.1e-04
S-35	1.9e-04	1.9e-05	1.1e-04	4.7e-04	6.3e-04	3.8e-05	3.8e-06	2.2e-05	9.2e-05	1.2e-04
Cl-36	7.5e-04	5.9e-05	4.0e-04	1.9e-03	2.6e-03	1.5e-04	1.2e-05	8.0e-05	3.7e-04	5.1e-04
K-40	8.3e-02	1.3e-02	5.8e-02	1.8e-01	2.4e-01	1.6e-02	2.5e-03	1.1e-02	3.6e-02	4.7e-02
Ca-41	3.1e-04	2.8e-05	1.8e-04	7.9e-04	1.0e-03	6.0e-05	5.6e-06	3.5e-05	1.6e-04	2.0e-04
Ca-45	9.1e-04	9.3e-05	5.3e-04	2.3e-03	3.0e-03	1.8e-04	1.8e-05	1.0e-04	4.5e-04	5.9e-04
Sc-46	1.9e+00	2.5e-01	1.2e+00	4.7e+00	5.6e+00	3.7e-01	5.0e-02	2.3e-01	9.2e-01	1.1e+00
Cr-51	3.0e-03	0.0e+00	1.6e-03	7.5e-03	1.1e-02	5.9e-04	0.0e+00	3.1e-04	1.5e-03	2.2e-03
Mn-53	3.0e-05	1.5e-06	1.6e-05	7.3e-05	1.1e-04	6.0e-06	3.0e-07	3.3e-06	1.4e-05	2.2e-05
Mn-54	5.0e-01	3.2e-02	3.2e-01	1.2e+00	1.7e+00	9.8e-02	6.4e-03	6.2e-02	2.3e-01	3.4e-01
Fe-55	3.0e-06	0.0e+00	1.5e-06	7.4e-06	1.1e-05	5.9e-07	0.0e+00	3.1e-07	1.5e-06	2.2e-06
Fe-59	1.3e-02	0.0e+00	7.7e-03	3.2e-02	4.8e-02	2.6e-03	0.0e+00	1.5e-03	6.4e-03	9.5e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	4.1e-01	5.6e-02	2.5e-01	1.0e+00	1.2e+00	8.1e-02	1.1e-02	4.9e-02	2.0e-01	2.4e-01
Sr-89	3.3e-03	4.5e-04	2.0e-03	8.0e-03	9.7e-03	6.4e-04	9.0e-05	3.9e-04	1.6e-03	1.9e-03
Sr-90	5.2e-02	5.7e-03	3.1e-02	1.3e-01	1.7e-01	1.0e-02	1.1e-03	6.1e-03	2.6e-02	3.2e-02
Y-91	9.0e-03	1.2e-03	5.5e-03	2.2e-02	2.6e-02	1.8e-03	2.4e-04	1.1e-03	4.3e-03	5.2e-03
Zr-93	7.5e-03	6.6e-04	4.1e-03	1.8e-02	2.5e-02	1.5e-03	1.3e-04	8.1e-04	3.6e-03	4.9e-03
Zr-95	1.0e+00	1.3e-01	6.1e-01	2.5e+00	2.9e+00	2.0e-01	2.5e-02	1.2e-01	4.9e-01	5.7e-01
Nb-93m	2.6e-03	2.3e-04	1.4e-03	6.3e-03	8.8e-03	5.1e-04	4.6e-05	2.8e-04	1.2e-03	1.7e-03
Nb-94	2.0e+00	2.5e-01	1.2e+00	4.9e+00	5.8e+00	3.9e-01	5.0e-02	2.4e-01	9.7e-01	1.1e+00
Nb-95	4.9e-01	6.8e-02	3.0e-01	1.2e+00	1.5e+00	9.7e-02	1.4e-02	5.9e-02	2.4e-01	2.9e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.6e-02	0.0e+00	1.4e-02	6.6e-02	1.0e-01	5.2e-03	0.0e+00	2.9e-03	1.3e-02	2.0e-02
Sb-125	8.3e-03	0.0e+00	4.6e-03	2.1e-02	3.2e-02	1.6e-03	0.0e+00	9.0e-04	4.1e-03	6.2e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.3e-03	8.0e-05	6.7e-04	3.4e-03	5.0e-03	2.6e-04	1.6e-05	1.3e-04	6.7e-04	9.7e-04
I-129	1.4e-02	7.9e-04	7.1e-03	3.6e-02	5.2e-02	2.7e-03	1.6e-04	1.4e-03	7.0e-03	1.0e-02
I-131	9.6e-03	3.2e-04	3.3e-03	2.4e-02	4.1e-02	1.9e-03	6.3e-05	6.6e-04	4.8e-03	8.1e-03
Cs-134	2.4e-01	4.5e-03	2.9e-02	9.5e-01	1.4e+00	4.7e-02	9.0e-04	5.8e-03	1.9e-01	2.8e-01
Cs-135	1.8e-04	2.4e-06	2.1e-05	6.4e-04	1.1e-03	3.6e-05	4.6e-07	4.3e-06	1.3e-04	2.2e-04
Cs-137	9.0e-02	1.7e-03	1.1e-02	3.6e-01	5.3e-01	1.8e-02	3.4e-04	2.1e-03	7.0e-02	1.0e-01
Ba-133	3.9e-01	4.9e-02	2.4e-01	9.6e-01	1.1e+00	7.6e-02	9.6e-03	4.6e-02	1.9e-01	2.2e-01
Ce-139	8.7e-02	1.1e-02	5.3e-02	2.2e-01	2.5e-01	1.7e-02	2.2e-03	1.0e-02	4.2e-02	4.9e-02
Ce-141	2.4e-02	3.4e-03	1.4e-02	5.9e-02	7.4e-02	4.7e-03	6.6e-04	2.9e-03	1.2e-02	1.4e-02
Ce-144	8.4e-02	1.1e-02	5.1e-02	2.1e-01	2.4e-01	1.7e-02	2.1e-03	1.0e-02	4.0e-02	4.7e-02
Pm-147	3.5e-03	3.1e-04	1.9e-03	8.5e-03	1.2e-02	6.8e-04	6.3e-05	3.8e-04	1.7e-03	2.3e-03

Table F1.39 Normalized effective dose equivalents from all pathways: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.7e-03	2.3e-04	1.5e-03	6.5e-03	8.9e-03	5.2e-04	4.7e-05	2.9e-04	1.3e-03	1.7e-03
Eu-152	1.4e+00	1.8e-01	8.6e-01	3.5e+00	4.1e+00	2.8e-01	3.5e-02	1.7e-01	6.9e-01	8.0e-01
Eu-154	1.4e+00	1.8e-01	8.4e-01	3.4e+00	4.0e+00	2.7e-01	3.4e-02	1.7e-01	6.8e-01	7.8e-01
Eu-155	2.1e-02	2.7e-03	1.3e-02	5.3e-02	6.2e-02	4.2e-03	5.4e-04	2.6e-03	1.0e-02	1.2e-02
Gd-153	2.1e-02	2.7e-03	1.3e-02	5.2e-02	6.1e-02	4.1e-03	5.4e-04	2.5e-03	1.0e-02	1.2e-02
Tb-160	9.9e-01	1.3e-01	6.0e-01	2.4e+00	2.9e+00	2.0e-01	2.6e-02	1.2e-01	4.8e-01	5.7e-01
Tm-170	3.7e-03	4.6e-04	2.2e-03	9.0e-03	1.1e-02	7.4e-04	9.1e-05	4.4e-04	1.8e-03	2.2e-03
Tm-171	8.8e-04	8.5e-05	5.0e-04	2.1e-03	2.9e-03	1.7e-04	1.7e-05	9.9e-05	4.2e-04	5.6e-04
Ta-182	1.2e+00	1.7e-01	7.6e-01	3.1e+00	3.6e+00	2.5e-01	3.3e-02	1.5e-01	6.1e-01	7.1e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.1e+00	3.9e-01	1.9e+00	7.6e+00	8.9e+00	6.1e-01	7.7e-02	3.7e-01	1.5e+00	1.7e+00
Ra-228	2.8e+00	3.0e-01	1.6e+00	6.6e+00	8.4e+00	5.5e-01	6.1e-02	3.3e-01	1.3e+00	1.6e+00
Ac-227	1.2e+02	1.0e+01	6.4e+01	2.8e+02	3.9e+02	2.3e+01	2.0e+00	1.3e+01	5.6e+01	7.7e+01
Th-228	3.1e+01	2.8e+00	1.7e+01	7.5e+01	1.0e+02	6.0e+00	5.7e-01	3.4e+00	1.5e+01	2.0e+01
Th-229	1.5e+02	1.3e+01	8.3e+01	3.7e+02	5.1e+02	3.0e+01	2.6e+00	1.6e+01	7.3e+01	1.0e+02
Th-230	2.3e+01	2.0e+00	1.2e+01	5.6e+01	7.7e+01	4.5e+00	3.9e-01	2.5e+00	1.1e+01	1.5e+01
Th-232	1.0e+02	8.6e+00	5.5e+01	2.5e+02	3.4e+02	2.0e+01	1.7e+00	1.1e+01	4.8e+01	6.6e+01
Pa-231	7.6e+01	6.7e+00	4.2e+01	1.9e+02	2.6e+02	1.5e+01	1.3e+00	8.3e+00	3.7e+01	5.0e+01
U-232	5.8e+01	5.0e+00	3.2e+01	1.4e+02	2.0e+02	1.1e+01	9.9e-01	6.3e+00	2.8e+01	3.9e+01
U-233	1.2e+01	1.0e+00	6.4e+00	2.9e+01	4.0e+01	2.3e+00	2.0e-01	1.3e+00	5.6e+00	7.8e+00
U-234	1.1e+01	9.9e-01	6.3e+00	2.8e+01	3.9e+01	2.3e+00	2.0e-01	1.2e+00	5.5e+00	7.6e+00
U-235	1.1e+01	9.4e-01	5.9e+00	2.6e+01	3.6e+01	2.1e+00	1.9e-01	1.2e+00	5.2e+00	7.1e+00
U-236	1.1e+01	9.4e-01	6.0e+00	2.7e+01	3.7e+01	2.1e+00	1.9e-01	1.2e+00	5.2e+00	7.2e+00
U-238	1.0e+01	8.9e-01	5.6e+00	2.5e+01	3.5e+01	2.0e+00	1.8e-01	1.1e+00	4.9e+00	6.8e+00
Np-237	4.8e+01	4.2e+00	2.6e+01	1.2e+02	1.6e+02	9.4e+00	8.4e-01	5.2e+00	2.3e+01	3.1e+01
Pu-236	1.1e+01	9.8e-01	6.2e+00	2.7e+01	3.8e+01	2.2e+00	2.0e-01	1.2e+00	5.3e+00	7.4e+00
Pu-238	2.5e+01	2.2e+00	1.4e+01	6.2e+01	8.5e+01	5.0e+00	4.5e-01	2.8e+00	1.2e+01	1.7e+01
Pu-239	2.7e+01	2.4e+00	1.5e+01	6.7e+01	9.1e+01	5.4e+00	4.8e-01	3.0e+00	1.3e+01	1.8e+01
Pu-240	2.7e+01	2.4e+00	1.5e+01	6.7e+01	9.1e+01	5.4e+00	4.8e-01	3.0e+00	1.3e+01	1.8e+01
Pu-241	4.4e-01	3.9e-02	2.4e-01	1.1e+00	1.5e+00	8.7e-02	7.8e-03	4.8e-02	2.1e-01	2.9e-01
Pu-242	2.6e+01	2.3e+00	1.4e+01	6.3e+01	8.7e+01	5.1e+00	4.6e-01	2.8e+00	1.2e+01	1.7e+01
Pu-244	2.6e+01	2.3e+00	1.4e+01	6.3e+01	8.7e+01	5.1e+00	4.6e-01	2.8e+00	1.2e+01	1.7e+01
Am-241	3.9e+01	3.4e+00	2.1e+01	9.6e+01	1.3e+02	7.7e+00	6.8e-01	4.2e+00	1.9e+01	2.6e+01
Am-242m	3.9e+01	3.4e+00	2.1e+01	9.5e+01	1.3e+02	7.6e+00	6.7e-01	4.2e+00	1.9e+01	2.5e+01
Am-243	3.9e+01	3.4e+00	2.1e+01	9.5e+01	1.3e+02	7.7e+00	6.8e-01	4.2e+00	1.9e+01	2.6e+01
Cm-242	1.3e+00	1.2e-01	7.3e-01	3.2e+00	4.4e+00	2.6e-01	2.3e-02	1.4e-01	6.3e-01	8.7e-01
Cm-243	2.7e+01	2.4e+00	1.5e+01	6.6e+01	9.1e+01	5.3e+00	4.7e-01	2.9e+00	1.3e+01	1.8e+01
Cm-244	2.2e+01	1.9e+00	1.2e+01	5.3e+01	7.3e+01	4.3e+00	3.8e-01	2.4e+00	1.0e+01	1.4e+01
Cm-245	4.0e+01	3.5e+00	2.2e+01	9.8e+01	1.4e+02	7.9e+00	7.0e-01	4.3e+00	1.9e+01	2.6e+01
Cm-246	4.0e+01	3.4e+00	2.2e+01	9.7e+01	1.3e+02	7.8e+00	6.9e-01	4.3e+00	1.9e+01	2.6e+01
Cm-247	3.7e+01	3.2e+00	2.0e+01	9.0e+01	1.2e+02	7.3e+00	6.5e-01	4.0e+00	1.8e+01	2.4e+01
Cm-248	1.5e+02	1.3e+01	8.0e+01	3.6e+02	4.9e+02	2.9e+01	2.5e+00	1.6e+01	7.0e+01	9.6e+01
Bk-249	1.2e-01	1.0e-02	6.6e-02	2.9e-01	4.0e-01	2.4e-02	2.1e-03	1.3e-02	5.7e-02	7.9e-02
Cf-248	4.2e+00	3.7e-01	2.3e+00	1.0e+01	1.4e+01	8.3e-01	7.4e-02	4.6e-01	2.0e+00	2.8e+00
Cf-249	3.4e+01	3.0e+00	1.9e+01	8.3e+01	1.1e+02	6.7e+00	6.1e-01	3.7e+00	1.6e+01	2.2e+01
Cf-250	1.8e+01	1.6e+00	1.0e+01	4.4e+01	6.1e+01	3.6e+00	3.2e-01	2.0e+00	8.7e+00	1.2e+01
Cf-251	3.4e+01	3.0e+00	1.9e+01	8.4e+01	1.2e+02	6.8e+00	6.1e-01	3.8e+00	1.7e+01	2.3e+01
Cf-252	1.3e+01	1.2e+00	7.4e+00	3.3e+01	4.5e+01	2.6e+00	2.3e-01	1.5e+00	6.4e+00	8.8e+00
Cf-254	3.2e+01	4.1e+00	1.9e+01	7.7e+01	9.5e+01	6.3e+00	8.1e-01	3.8e+00	1.5e+01	1.9e+01
Es-254	4.4e+00	4.8e-01	2.6e+00	1.1e+01	1.4e+01	8.7e-01	9.5e-02	5.1e-01	2.1e+00	2.7e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.40 Normalized effective dose equivalents from external exposure: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+00	1.7e-01	7.4e-01	2.3e+00	3.1e+00	2.1e-01	3.3e-02	1.5e-01	4.5e-01	6.0e-01
P-32	6.8e-04	6.9e-05	3.6e-04	1.7e-03	2.5e-03	1.3e-04	1.4e-05	7.2e-05	3.4e-04	4.8e-04
S-35	1.3e-06	1.7e-07	7.9e-07	3.3e-06	3.9e-06	2.6e-07	3.3e-08	1.6e-07	6.4e-07	7.5e-07
Cl-36	1.6e-04	1.5e-05	9.4e-05	4.1e-04	5.5e-04	3.2e-05	2.9e-06	1.9e-05	8.2e-05	1.1e-04
K-40	8.1e-02	1.3e-02	5.6e-02	1.8e-01	2.4e-01	1.6e-02	2.5e-03	1.1e-02	3.5e-02	4.6e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.1e-05	1.4e-06	6.7e-06	2.7e-05	3.2e-05	2.2e-06	2.8e-07	1.3e-06	5.3e-06	6.3e-06
Sc-46	1.9e+00	2.5e-01	1.2e+00	4.7e+00	5.6e+00	3.7e-01	5.0e-02	2.3e-01	9.2e-01	1.1e+00
Cr-51	3.0e-03	0.0e+00	1.6e-03	7.5e-03	1.1e-02	5.9e-04	0.0e+00	3.1e-04	1.5e-03	2.2e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	5.0e-01	3.2e-02	3.2e-01	1.2e+00	1.7e+00	9.8e-02	6.4e-03	6.2e-02	2.3e-01	3.4e-01
Fe-55	1.3e-12	0.0e+00	7.9e-13	3.3e-12	4.8e-12	2.6e-13	0.0e+00	1.6e-13	6.6e-13	9.5e-13
Fe-59	1.3e-02	0.0e+00	7.7e-03	3.2e-02	4.8e-02	2.6e-03	0.0e+00	1.5e-03	6.4e-03	9.5e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	4.1e-01	5.6e-02	2.5e-01	1.0e+00	1.2e+00	8.1e-02	1.1e-02	4.9e-02	2.0e-01	2.4e-01
Sr-89	2.0e-03	2.8e-04	1.2e-03	5.0e-03	6.1e-03	4.0e-04	5.6e-05	2.4e-04	9.9e-04	1.2e-03
Sr-90	8.2e-03	1.0e-03	5.0e-03	2.0e-02	2.4e-02	1.6e-03	2.0e-04	9.8e-04	4.0e-03	4.7e-03
Y-91	5.3e-03	7.2e-04	3.2e-03	1.3e-02	1.6e-02	1.0e-03	1.4e-04	6.3e-04	2.6e-03	3.0e-03
Zr-93	4.9e-09	6.2e-10	3.0e-09	1.2e-08	1.4e-08	9.7e-10	1.2e-10	5.9e-10	2.4e-09	2.8e-09
Zr-95	1.0e+00	1.3e-01	6.1e-01	2.5e+00	2.9e+00	2.0e-01	2.5e-02	1.2e-01	4.9e-01	5.7e-01
Nb-93m	9.4e-10	1.2e-10	5.8e-10	2.4e-09	2.8e-09	1.9e-10	2.4e-11	1.1e-10	4.6e-10	5.4e-10
Nb-94	1.9e+00	2.5e-01	1.2e+00	4.8e+00	5.7e+00	3.8e-01	4.9e-02	2.3e-01	9.6e-01	1.1e+00
Nb-95	4.9e-01	6.8e-02	3.0e-01	1.2e+00	1.5e+00	9.7e-02	1.4e-02	5.9e-02	2.4e-01	2.9e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.6e-02	0.0e+00	1.4e-02	6.6e-02	1.0e-01	5.2e-03	0.0e+00	2.9e-03	1.3e-02	2.0e-02
Sb-125	8.3e-03	0.0e+00	4.5e-03	2.1e-02	3.1e-02	1.6e-03	0.0e+00	9.0e-04	4.1e-03	6.2e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.4e-05	1.2e-06	7.7e-06	3.5e-05	4.7e-05	2.7e-06	2.5e-07	1.5e-06	6.9e-06	9.1e-06
I-129	3.1e-05	2.7e-06	1.7e-05	7.8e-05	1.0e-04	6.1e-06	5.3e-07	3.4e-06	1.6e-05	2.1e-05
I-131	9.4e-03	3.1e-04	3.2e-03	2.3e-02	4.0e-02	1.8e-03	6.1e-05	6.5e-04	4.7e-03	7.9e-03
Cs-134	2.4e-01	4.5e-03	2.9e-02	9.4e-01	1.4e+00	4.7e-02	8.9e-04	5.7e-03	1.9e-01	2.7e-01
Cs-135	2.3e-06	4.3e-08	2.8e-07	9.2e-06	1.4e-05	4.6e-07	8.6e-09	5.6e-08	1.8e-06	2.7e-06
Cs-137	8.9e-02	1.7e-03	1.1e-02	3.5e-01	5.2e-01	1.7e-02	3.3e-04	2.1e-03	6.9e-02	1.0e-01
Ba-133	3.8e-01	4.9e-02	2.3e-01	9.6e-01	1.1e+00	7.6e-02	9.6e-03	4.6e-02	1.9e-01	2.2e-01
Ce-139	8.6e-02	1.1e-02	5.3e-02	2.1e-01	2.5e-01	1.7e-02	2.2e-03	1.0e-02	4.2e-02	4.9e-02
Ce-141	2.3e-02	3.3e-03	1.4e-02	5.7e-02	7.2e-02	4.6e-03	6.4e-04	2.8e-03	1.1e-02	1.4e-02
Ce-144	5.1e-02	6.6e-03	3.1e-02	1.3e-01	1.5e-01	1.0e-02	1.3e-03	6.2e-03	2.5e-02	2.9e-02
Pm-147	7.7e-06	9.7e-07	4.7e-06	1.9e-05	2.2e-05	1.5e-06	1.9e-07	9.2e-07	3.8e-06	4.4e-06

Table F1.40 Normalized effective dose equivalents from external exposure: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.8e-08	2.3e-09	1.1e-08	4.6e-08	5.4e-08	3.6e-09	4.6e-10	2.2e-09	9.1e-09	1.1e-08
Eu-152	1.4e+00	1.8e-01	8.5e-01	3.5e+00	4.1e+00	2.7e-01	3.5e-02	1.7e-01	6.8e-01	7.9e-01
Eu-154	1.4e+00	1.7e-01	8.3e-01	3.4e+00	3.9e+00	2.7e-01	3.4e-02	1.6e-01	6.6e-01	7.7e-01
Eu-155	1.8e-02	2.2e-03	1.1e-02	4.4e-02	5.2e-02	3.5e-03	4.4e-04	2.1e-03	8.7e-03	1.0e-02
Gd-153	2.0e-02	2.6e-03	1.2e-02	5.0e-02	5.9e-02	4.0e-03	5.1e-04	2.4e-03	9.9e-03	1.2e-02
Tb-160	9.9e-01	1.3e-01	6.0e-01	2.4e+00	2.9e+00	1.9e-01	2.6e-02	1.2e-01	4.8e-01	5.7e-01
Tm-170	1.2e-03	1.6e-04	7.4e-04	3.0e-03	3.5e-03	2.4e-04	3.1e-05	1.4e-04	5.9e-04	6.9e-04
Tm-171	5.0e-05	6.3e-06	3.0e-05	1.2e-04	1.5e-04	9.8e-06	1.2e-06	6.0e-06	2.4e-05	2.8e-05
Ta-182	1.2e+00	1.6e-01	7.6e-01	3.1e+00	3.6e+00	2.5e-01	3.2e-02	1.5e-01	6.1e-01	7.1e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.1e+00	2.7e-01	1.3e+00	5.3e+00	6.2e+00	4.2e-01	5.3e-02	2.6e-01	1.0e+00	1.2e+00
Ra-228	1.1e+00	1.4e-01	6.7e-01	2.8e+00	3.2e+00	2.2e-01	2.7e-02	1.3e-01	5.5e-01	6.4e-01
Ac-227	4.1e-01	5.1e-02	2.5e-01	1.0e+00	1.2e+00	8.0e-02	1.0e-02	4.9e-02	2.0e-01	2.3e-01
Th-228	1.7e+00	2.2e-01	1.0e+00	4.2e+00	5.0e+00	3.4e-01	4.3e-02	2.0e-01	8.4e-01	9.8e-01
Th-229	2.8e-01	3.5e-02	1.7e-01	7.0e-01	8.2e-01	5.5e-02	7.0e-03	3.4e-02	1.5e-01	1.6e-01
Th-230	2.3e-04	2.6e-05	1.4e-04	5.7e-04	6.8e-04	4.5e-05	5.1e-06	2.7e-05	1.1e-04	1.3e-04
Th-232	1.3e-02	1.1e-03	7.5e-03	3.3e-02	4.3e-02	2.5e-03	2.1e-04	1.5e-03	6.6e-03	8.4e-03
Pa-231	3.5e-02	4.4e-03	2.1e-02	8.7e-02	1.0e-01	6.9e-03	8.6e-04	4.2e-03	1.7e-02	2.0e-02
U-232	6.1e-02	5.1e-03	3.6e-02	1.6e-01	2.0e-01	1.2e-02	1.0e-03	7.1e-03	3.1e-02	4.0e-02
U-233	1.6e-04	2.0e-05	9.7e-05	3.9e-04	4.6e-04	3.1e-05	3.9e-06	1.9e-05	7.8e-05	9.1e-05
U-234	3.4e-05	4.3e-06	2.1e-05	8.5e-05	1.0e-04	6.8e-06	8.6e-07	4.1e-06	1.7e-05	2.0e-05
U-235	1.3e-01	1.7e-02	8.1e-02	3.3e-01	3.9e-01	2.6e-02	3.3e-03	1.6e-02	6.5e-02	7.6e-02
U-236	1.4e-05	1.8e-06	8.5e-06	3.5e-05	4.1e-05	2.7e-06	3.5e-07	1.7e-06	6.8e-06	7.9e-06
U-238	3.0e-02	3.7e-03	1.8e-02	7.4e-02	8.6e-02	5.8e-03	7.4e-04	3.6e-03	1.5e-02	1.7e-02
Np-237	2.2e-01	2.8e-02	1.3e-01	5.4e-01	6.4e-01	4.3e-02	5.4e-03	2.6e-02	1.1e-01	1.2e-01
Pu-236	4.6e-05	3.3e-06	2.6e-05	1.2e-04	1.6e-04	9.0e-06	6.7e-07	5.2e-06	2.3e-05	3.2e-05
Pu-238	4.9e-06	6.2e-07	3.0e-06	1.2e-05	1.4e-05	9.6e-07	1.2e-07	5.9e-07	2.4e-06	2.8e-06
Pu-239	4.3e-05	5.5e-06	2.6e-05	1.1e-04	1.3e-04	8.6e-06	1.1e-06	5.2e-06	2.1e-05	2.5e-05
Pu-240	4.6e-06	5.8e-07	2.8e-06	1.2e-05	1.3e-05	9.1e-07	1.1e-07	5.6e-07	2.3e-06	2.6e-06
Pu-241	1.0e-06	1.2e-07	6.3e-07	2.6e-06	3.1e-06	2.1e-07	2.4e-08	1.3e-07	5.1e-07	6.1e-07
Pu-242	4.6e-06	5.8e-07	2.8e-06	1.1e-05	1.3e-05	9.0e-07	1.1e-07	5.5e-07	2.2e-06	2.6e-06
Pu-244	4.0e-01	5.0e-02	2.4e-01	9.8e-01	1.2e+00	7.8e-02	9.8e-03	4.7e-02	1.9e-01	2.3e-01
Am-241	2.3e-03	2.9e-04	1.4e-03	5.8e-03	6.8e-03	4.6e-04	5.8e-05	2.8e-04	1.1e-03	1.3e-03
Am-242m	9.5e-03	1.2e-03	5.8e-03	2.4e-02	2.8e-02	1.9e-03	2.4e-04	1.1e-03	4.7e-03	5.4e-03
Am-243	1.4e-01	1.8e-02	8.5e-02	3.5e-01	4.1e-01	2.8e-02	3.5e-03	1.7e-02	6.8e-02	8.0e-02
Cm-242	4.3e-06	5.6e-07	2.7e-06	1.1e-05	1.3e-05	8.6e-07	1.1e-07	5.2e-07	2.1e-06	2.5e-06
Cm-243	9.7e-02	1.2e-02	5.9e-02	2.4e-01	2.8e-01	1.9e-02	2.4e-03	1.2e-02	4.8e-02	5.5e-02
Cm-244	4.2e-06	5.3e-07	2.5e-06	1.0e-05	1.2e-05	8.2e-07	1.0e-07	5.0e-07	2.0e-06	2.4e-06
Cm-245	4.9e-02	6.2e-03	3.0e-02	1.2e-01	1.4e-01	9.7e-03	1.2e-03	5.9e-03	2.4e-02	2.8e-02
Cm-246	3.7e-07	4.6e-08	2.2e-07	9.0e-07	1.1e-06	7.2e-08	9.1e-09	4.4e-08	1.8e-07	2.1e-07
Cm-247	3.7e-01	4.7e-02	2.3e-01	9.3e-01	1.1e+00	7.4e-02	9.3e-03	4.5e-02	1.8e-01	2.1e-01
Cm-248	3.2e-07	4.0e-08	1.9e-07	7.8e-07	9.2e-07	6.2e-08	7.9e-09	3.8e-08	1.5e-07	1.8e-07
Bk-249	6.9e-05	5.9e-06	4.1e-05	1.8e-04	2.3e-04	1.4e-05	1.2e-06	8.1e-06	3.5e-05	4.5e-05
Cf-248	7.2e-06	9.2e-07	4.4e-06	1.8e-05	2.1e-05	1.4e-06	1.8e-07	8.6e-07	3.5e-06	4.1e-06
Cf-249	3.7e-01	4.7e-02	2.3e-01	9.2e-01	1.1e+00	7.3e-02	9.2e-03	4.4e-02	1.8e-01	2.1e-01
Cf-250	1.9e-07	2.5e-08	1.2e-07	4.8e-07	5.7e-07	3.8e-08	4.8e-09	2.3e-08	9.5e-08	1.1e-07
Cf-251	7.7e-02	9.8e-03	4.7e-02	1.9e-01	2.3e-01	1.5e-02	1.9e-03	9.3e-03	3.8e-02	4.4e-02
Cf-252	7.5e-06	9.6e-07	4.6e-06	1.9e-05	2.2e-05	1.5e-06	1.9e-07	9.0e-07	3.7e-06	4.3e-06
Cf-254	1.5e+01	2.0e+00	9.0e+00	3.6e+01	4.4e+01	2.9e+00	4.0e-01	1.8e+00	7.2e+00	8.5e+00
Es-254	1.0e+00	1.3e-01	6.3e-01	2.6e+00	3.0e+00	2.0e-01	2.5e-02	1.2e-01	5.0e-01	5.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.41 Normalized effective dose equivalents from inhalation: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.6e-04	2.8e-05	1.6e-04	5.9e-04	8.3e-04	5.1e-05	5.4e-06	3.1e-05	1.1e-04	1.6e-04
P-32	9.0e-05	6.1e-06	4.2e-05	2.3e-04	3.4e-04	1.8e-05	1.2e-06	8.4e-06	4.4e-05	6.5e-05
S-35	1.5e-04	1.3e-05	8.0e-05	3.6e-04	4.9e-04	2.9e-05	2.5e-06	1.6e-05	7.1e-05	9.7e-05
Cl-36	4.7e-04	2.8e-05	2.3e-04	1.2e-03	1.7e-03	9.3e-05	5.6e-06	4.6e-05	2.3e-04	3.3e-04
K-40	4.3e-04	4.5e-05	2.6e-04	1.0e-03	1.4e-03	8.6e-05	9.0e-06	5.2e-05	2.0e-04	2.7e-04
Ca-41	1.2e-04	1.0e-05	6.4e-05	2.9e-04	3.9e-04	2.3e-05	2.0e-06	1.3e-05	5.6e-05	7.7e-05
Ca-45	4.9e-04	4.4e-05	2.7e-04	1.2e-03	1.6e-03	9.7e-05	8.7e-06	5.3e-05	2.4e-04	3.2e-04
Sc-46	1.9e-03	1.7e-04	1.1e-03	4.7e-03	6.4e-03	3.8e-04	3.4e-05	2.1e-04	9.3e-04	1.3e-03
Cr-51	2.4e-06	0.0e+00	1.0e-06	8.0e-06	9.7e-06	4.7e-07	0.0e+00	2.0e-07	1.2e-06	1.9e-06
Mn-53	2.2e-05	9.8e-07	1.1e-05	5.4e-05	8.1e-05	4.4e-06	1.9e-07	2.2e-06	1.1e-05	1.6e-05
Mn-54	2.7e-04	1.2e-05	1.4e-04	6.7e-04	1.0e-03	5.4e-05	2.4e-06	2.7e-05	1.3e-04	1.9e-04
Fe-55	1.7e-06	0.0e+00	7.8e-07	4.2e-06	6.5e-06	3.3e-07	0.0e+00	1.5e-07	8.3e-07	1.3e-06
Fe-59	9.2e-06	0.0e+00	4.2e-06	2.3e-05	3.6e-05	1.8e-06	0.0e+00	8.5e-07	4.6e-06	7.0e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.1e-04	1.0e-05	6.3e-05	2.8e-04	3.8e-04	2.3e-05	2.1e-06	1.2e-05	5.5e-05	7.6e-05
Sr-89	3.5e-04	3.2e-05	1.9e-04	8.6e-04	1.2e-03	6.9e-05	6.3e-06	3.8e-05	1.7e-04	2.3e-04
Sr-90	2.1e-02	1.8e-03	1.2e-02	5.3e-02	7.3e-02	4.2e-03	3.6e-04	2.3e-03	1.0e-02	1.4e-02
Y-91	2.8e-03	2.5e-04	1.5e-03	6.9e-03	9.5e-03	5.5e-04	5.1e-05	3.0e-04	1.4e-03	1.9e-03
Zr-93	7.2e-03	6.2e-04	4.0e-03	1.8e-02	2.4e-02	1.4e-03	1.2e-04	7.8e-04	3.5e-03	4.8e-03
Zr-95	1.1e-03	1.0e-04	6.3e-04	2.8e-03	3.8e-03	2.3e-04	2.0e-05	1.2e-04	5.5e-04	7.5e-04
Nb-93m	2.5e-03	2.2e-04	1.4e-03	6.2e-03	8.5e-03	5.0e-04	4.3e-05	2.7e-04	1.2e-03	1.7e-03
Nb-94	3.6e-02	3.1e-03	2.0e-02	8.8e-02	1.2e-01	7.1e-03	6.2e-04	3.9e-03	1.7e-02	2.4e-02
Nb-95	2.6e-04	2.3e-05	1.4e-04	6.2e-04	8.8e-04	5.1e-05	4.6e-06	2.7e-05	1.2e-04	1.7e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.5e-05	0.0e+00	1.1e-05	6.2e-05	9.9e-05	4.8e-06	0.0e+00	2.1e-06	1.2e-05	1.9e-05
Sb-125	2.0e-05	0.0e+00	8.5e-06	5.0e-05	7.9e-05	3.9e-06	0.0e+00	1.7e-06	9.9e-06	1.5e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.5e-04	2.1e-05	1.7e-04	8.6e-04	1.3e-03	6.8e-05	4.2e-06	3.4e-05	1.7e-04	2.5e-04
I-129	3.7e-03	2.2e-04	1.8e-03	9.3e-03	1.4e-02	7.3e-04	4.4e-05	3.6e-04	1.8e-03	2.6e-03
I-131	3.9e-05	1.4e-06	1.8e-05	1.5e-04	2.5e-04	1.2e-05	2.7e-07	3.5e-06	2.9e-05	5.0e-05
Cs-134	5.0e-04	6.3e-06	5.4e-05	1.6e-03	2.8e-03	9.9e-05	1.2e-06	1.1e-05	3.2e-04	5.5e-04
Cs-135	5.1e-05	6.3e-07	5.5e-06	1.7e-04	2.9e-04	1.0e-05	1.3e-07	1.1e-06	3.3e-05	5.6e-05
Cs-137	3.6e-04	4.4e-06	3.9e-05	1.2e-03	2.0e-03	7.0e-05	8.8e-07	7.7e-06	2.3e-04	3.9e-04
Ba-133	8.7e-04	5.8e-05	3.7e-04	1.7e-03	2.3e-03	1.3e-04	1.1e-05	7.3e-05	3.2e-04	4.4e-04
Ce-139	6.6e-04	5.9e-05	3.6e-04	1.6e-03	2.2e-03	1.3e-04	1.2e-05	7.1e-05	3.2e-04	4.3e-04
Ce-141	3.8e-04	3.4e-05	2.0e-04	9.1e-04	1.3e-03	7.4e-05	6.8e-06	4.0e-05	1.8e-04	2.5e-04
Ce-144	3.0e-02	2.6e-03	1.6e-02	7.3e-02	9.9e-02	5.9e-03	5.2e-04	3.2e-03	1.4e-02	2.0e-02
Pm-147	3.3e-03	2.9e-04	1.8e-03	8.1e-03	1.1e-02	6.5e-04	5.7e-05	3.6e-04	1.6e-03	2.2e-03

Table F1.41 Normalized effective dose equivalents from inhalation: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.6e-03	2.2e-04	1.4e-03	6.4e-03	8.8e-03	5.1e-04	4.5e-05	2.8e-04	1.2e-03	1.7e-03
Eu-152	1.9e-02	1.6e-03	1.0e-02	4.7e-02	6.4e-02	3.8e-03	3.3e-04	2.1e-03	9.1e-03	1.3e-02
Eu-154	2.5e-02	2.1e-03	1.4e-02	6.0e-02	8.3e-02	4.8e-03	4.2e-04	2.7e-03	1.2e-02	1.6e-02
Eu-155	3.5e-03	3.0e-04	1.9e-03	8.7e-03	1.2e-02	7.0e-04	6.1e-05	3.8e-04	1.7e-03	2.3e-03
Gd-153	7.4e-04	6.5e-05	4.1e-04	1.8e-03	2.5e-03	1.5e-04	1.3e-05	8.0e-05	3.6e-04	4.9e-04
Tb-160	1.6e-03	1.4e-04	8.5e-04	3.8e-03	5.2e-03	3.1e-04	2.8e-05	1.7e-04	7.4e-04	1.0e-03
Tm-170	1.9e-03	1.7e-04	1.0e-03	4.6e-03	6.3e-03	3.7e-04	3.3e-05	2.0e-04	9.1e-04	1.2e-03
Tm-171	7.7e-04	6.6e-05	4.2e-04	1.9e-03	2.6e-03	1.5e-04	1.3e-05	8.3e-05	3.7e-04	5.1e-04
Ta-182	3.1e-03	2.8e-04	1.7e-03	7.7e-03	1.0e-02	6.2e-04	5.6e-05	3.4e-04	1.5e-03	2.1e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	7.5e-01	6.4e-02	4.1e-01	1.8e+00	2.5e+00	1.5e-01	1.3e-02	8.1e-02	3.6e-01	4.9e-01
Ra-228	1.4e+00	1.0e-01	7.5e-01	3.6e+00	5.1e+00	2.9e-01	2.1e-02	1.5e-01	7.0e-01	9.9e-01
Ac-227	1.1e+02	9.7e+00	6.2e+01	2.8e+02	3.8e+02	2.2e+01	1.9e+00	1.2e+01	5.5e+01	7.5e+01
Th-228	2.9e+01	2.5e+00	1.6e+01	7.1e+01	9.7e+01	5.7e+00	5.0e-01	3.1e+00	1.4e+01	1.9e+01
Th-229	1.5e+02	1.3e+01	8.3e+01	3.7e+02	5.1e+02	3.0e+01	2.6e+00	1.6e+01	7.2e+01	1.0e+02
Th-230	2.3e+01	1.9e+00	1.2e+01	5.5e+01	7.6e+01	4.5e+00	3.9e-01	2.5e+00	1.1e+01	1.5e+01
Th-232	1.0e+02	8.6e+00	5.4e+01	2.4e+02	3.4e+02	2.0e+01	1.7e+00	1.1e+01	4.8e+01	6.6e+01
Pa-231	7.5e+01	6.4e+00	4.1e+01	1.8e+02	2.5e+02	1.5e+01	1.3e+00	8.1e+00	3.6e+01	5.0e+01
U-232	5.8e+01	5.0e+00	3.2e+01	1.4e+02	2.0e+02	1.1e+01	9.9e-01	6.3e+00	2.8e+01	3.9e+01
U-233	1.2e+01	1.0e+00	6.4e+00	2.9e+01	4.0e+01	2.3e+00	2.0e-01	1.3e+00	5.6e+00	7.8e+00
U-234	1.1e+01	9.9e-01	6.3e+00	2.8e+01	3.9e+01	2.3e+00	2.0e-01	1.2e+00	5.5e+00	7.6e+00
U-235	1.1e+01	9.2e-01	5.8e+00	2.6e+01	3.6e+01	2.1e+00	1.8e-01	1.2e+00	5.1e+00	7.0e+00
U-236	1.1e+01	9.4e-01	6.0e+00	2.7e+01	3.7e+01	2.1e+00	1.9e-01	1.2e+00	5.2e+00	7.2e+00
U-238	1.0e+01	8.8e-01	5.6e+00	2.5e+01	3.5e+01	2.0e+00	1.8e-01	1.1e+00	4.9e+00	6.8e+00
Np-237	4.7e+01	4.0e+00	2.6e+01	1.2e+02	1.6e+02	9.2e+00	8.0e-01	5.1e+00	2.2e+01	3.1e+01
Pu-236	1.1e+01	9.5e-01	6.0e+00	2.7e+01	3.7e+01	2.2e+00	1.9e-01	1.2e+00	5.3e+00	7.3e+00
Pu-238	2.5e+01	2.1e+00	1.4e+01	6.1e+01	8.4e+01	4.8e+00	4.3e-01	2.7e+00	1.2e+01	1.7e+01
Pu-239	2.7e+01	2.3e+00	1.5e+01	6.5e+01	9.0e+01	5.3e+00	4.6e-01	2.9e+00	1.3e+01	1.8e+01
Pu-240	2.7e+01	2.3e+00	1.5e+01	6.5e+01	9.0e+01	5.3e+00	4.6e-01	2.9e+00	1.3e+01	1.8e+01
Pu-241	4.8e-01	3.7e-02	2.4e-01	1.1e+00	1.5e+00	8.5e-02	7.4e-03	4.7e-02	2.1e-01	2.9e-01
Pu-242	2.5e+01	2.2e+00	1.4e+01	6.2e+01	8.6e+01	5.0e+00	4.4e-01	2.7e+00	1.2e+01	1.7e+01
Pu-244	2.5e+01	2.2e+00	1.4e+01	6.1e+01	8.5e+01	4.9e+00	4.3e-01	2.7e+00	1.2e+01	1.7e+01
Am-241	3.9e+01	3.3e+00	2.1e+01	9.4e+01	1.3e+02	7.6e+00	6.6e-01	4.2e+00	1.8e+01	2.6e+01
Am-242m	3.8e+01	3.3e+00	2.1e+01	9.4e+01	1.3e+02	7.5e+00	6.5e-01	4.1e+00	1.8e+01	2.5e+01
Am-243	3.8e+01	3.3e+00	2.1e+01	9.4e+01	1.3e+02	7.5e+00	6.5e-01	4.1e+00	1.8e+01	2.5e+01
Cm-242	1.3e+00	1.2e-01	7.2e-01	3.2e+00	4.4e+00	2.6e-01	2.3e-02	1.4e-01	6.3e-01	8.6e-01
Cm-243	2.7e+01	2.3e+00	1.5e+01	6.5e+01	9.0e+01	5.2e+00	4.6e-01	2.9e+00	1.3e+01	1.8e+01
Cm-244	2.1e+01	1.8e+00	1.2e+01	5.3e+01	7.2e+01	4.2e+00	3.7e-01	2.3e+00	1.0e+01	1.4e+01
Cm-245	3.9e+01	3.4e+00	2.2e+01	9.7e+01	1.3e+02	7.8e+00	6.8e-01	4.3e+00	1.9e+01	2.6e+01
Cm-246	3.9e+01	3.3e+00	2.1e+01	9.6e+01	1.3e+02	7.7e+00	6.7e-01	4.2e+00	1.9e+01	2.6e+01
Cm-247	3.6e+01	3.1e+00	2.0e+01	8.8e+01	1.2e+02	7.1e+00	6.2e-01	3.9e+00	1.7e+01	2.4e+01
Cm-248	1.4e+02	1.2e+01	7.8e+01	3.5e+02	4.9e+02	2.8e+01	2.5e+00	1.5e+01	6.9e+01	9.5e+01
Bk-249	1.2e-01	1.0e-02	6.4e-02	2.9e-01	4.0e-01	2.3e-02	2.0e-03	1.3e-02	5.6e-02	7.8e-02
Cf-248	4.2e+00	3.6e-01	2.3e+00	1.0e+01	1.4e+01	8.2e-01	7.2e-02	4.5e-01	2.0e+00	2.7e+00
Cf-249	3.3e+01	2.8e+00	1.8e+01	8.1e+01	1.1e+02	6.5e+00	5.7e-01	3.6e+00	1.6e+01	2.2e+01
Cf-250	1.8e+01	1.5e+00	9.7e+00	4.4e+01	6.0e+01	3.5e+00	3.0e-01	1.9e+00	8.5e+00	1.2e+01
Cf-251	3.4e+01	2.9e+00	1.8e+01	8.3e+01	1.1e+02	6.6e+00	5.8e-01	3.6e+00	1.6e+01	2.2e+01
Cf-252	1.3e+01	1.1e+00	7.3e+00	3.3e+01	4.5e+01	2.6e+00	2.3e-01	1.4e+00	6.4e+00	8.8e+00
Cf-254	1.7e+01	1.6e+00	9.4e+00	4.2e+01	5.7e+01	3.4e+00	3.1e-01	1.8e+00	8.2e+00	1.1e+01
Es-254	3.3e+00	2.9e-01	1.8e+00	8.2e+00	1.1e+01	6.6e-01	5.8e-02	3.6e-01	1.6e+00	2.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.42 Normalized effective dose equivalents from ingestion: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	6.7e-04	3.0e-05	4.0e-04	1.6e-03	2.3e-03	1.3e-04	6.0e-06	7.9e-05	3.2e-04	4.5e-04
P-32	2.3e-04	7.0e-06	9.9e-05	5.8e-04	9.1e-04	4.5e-05	1.4e-06	2.0e-05	1.1e-04	1.8e-04
S-35	4.5e-05	1.7e-06	2.4e-05	1.2e-04	1.7e-04	9.0e-06	3.5e-07	4.7e-06	2.5e-05	3.3e-05
Cl-36	1.1e-04	3.1e-06	5.3e-05	2.9e-04	4.4e-04	2.2e-05	6.2e-07	1.1e-05	5.9e-05	8.8e-05
K-40	1.1e-03	5.0e-05	6.7e-04	2.7e-03	3.9e-03	2.2e-04	1.0e-05	1.3e-04	5.4e-04	7.6e-04
Ca-41	1.9e-04	7.3e-06	1.0e-04	5.2e-04	7.0e-04	3.7e-05	1.4e-06	2.0e-05	1.0e-04	1.4e-04
Ca-45	4.1e-04	1.6e-05	2.1e-04	1.1e-03	1.5e-03	8.0e-05	3.2e-06	4.3e-05	2.2e-04	2.9e-04
Sc-46	7.2e-04	2.6e-05	3.8e-04	2.0e-03	2.6e-03	1.4e-04	5.6e-06	7.5e-05	3.9e-04	5.2e-04
Cr-51	1.9e-06	0.0e+00	7.0e-07	4.9e-06	7.9e-06	3.7e-07	0.0e+00	1.4e-07	9.6e-07	1.6e-06
Mn-53	8.3e-06	1.8e-07	3.9e-06	2.1e-05	3.2e-05	1.6e-06	3.5e-08	7.7e-07	4.1e-06	6.4e-06
Mn-54	2.0e-04	4.2e-06	9.3e-05	5.0e-04	7.6e-04	3.9e-05	8.3e-07	1.9e-05	9.7e-05	1.5e-04
Fe-55	1.3e-06	0.0e+00	5.6e-07	3.4e-06	5.3e-06	2.6e-07	0.0e+00	1.1e-07	6.7e-07	1.1e-06
Fe-59	8.9e-06	0.0e+00	3.8e-06	2.3e-05	3.6e-05	1.7e-06	0.0e+00	7.5e-07	4.4e-06	7.1e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.0e-04	8.0e-06	1.1e-04	5.6e-04	7.5e-04	4.0e-05	1.6e-06	2.1e-05	1.1e-04	1.5e-04
Sr-89	8.6e-04	3.4e-05	4.6e-04	2.4e-03	3.2e-03	1.7e-04	6.7e-06	8.9e-05	4.6e-04	6.2e-04
Sr-90	2.3e-02	8.8e-04	1.2e-02	6.2e-02	8.5e-02	4.5e-03	1.7e-04	2.4e-03	1.2e-02	1.6e-02
Y-91	9.4e-04	3.7e-05	5.0e-04	2.6e-03	3.5e-03	1.9e-04	7.4e-06	9.8e-05	5.1e-04	6.8e-04
Zr-93	2.5e-04	9.6e-06	1.3e-04	6.8e-04	9.1e-04	4.9e-05	1.9e-06	2.6e-05	1.3e-04	1.8e-04
Zr-95	5.4e-04	2.1e-05	2.9e-04	1.5e-03	2.0e-03	1.1e-04	4.2e-06	5.7e-05	2.9e-04	3.9e-04
Nb-93m	7.7e-05	3.0e-06	4.1e-05	2.1e-04	2.9e-04	1.5e-05	5.9e-07	8.1e-06	4.2e-05	5.6e-05
Nb-94	1.1e-03	4.1e-05	5.6e-04	2.9e-03	4.0e-03	2.1e-04	8.1e-06	1.1e-04	5.7e-04	7.7e-04
Nb-95	2.0e-04	7.9e-06	1.0e-04	5.3e-04	7.3e-04	3.9e-05	1.5e-06	2.0e-05	1.0e-04	1.4e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.7e-05	0.0e+00	6.7e-06	4.5e-05	7.2e-05	3.4e-06	0.0e+00	1.3e-06	8.8e-06	1.4e-05
Sb-125	9.0e-06	0.0e+00	3.5e-06	2.3e-05	3.8e-05	1.8e-06	0.0e+00	6.9e-07	4.6e-06	7.6e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	9.6e-04	2.6e-05	4.4e-04	2.5e-03	3.7e-03	1.9e-04	5.1e-06	8.8e-05	4.9e-04	7.4e-04
I-129	1.0e-02	2.8e-04	4.8e-03	2.7e-02	4.0e-02	2.0e-03	5.5e-05	9.5e-04	5.2e-03	8.0e-03
I-131	1.7e-04	2.0e-06	4.6e-05	4.2e-04	7.4e-04	3.4e-05	4.1e-07	9.1e-06	8.2e-05	1.5e-04
Cs-134	1.3e-03	8.7e-06	1.5e-04	4.3e-03	7.9e-03	2.6e-04	1.7e-06	2.9e-05	8.5e-04	1.6e-03
Cs-135	1.3e-04	8.6e-07	1.5e-05	4.3e-04	7.9e-04	2.6e-05	1.7e-07	2.9e-06	8.5e-05	1.6e-04
Cs-137	9.2e-04	6.1e-06	1.0e-04	3.0e-03	5.6e-03	1.8e-04	1.2e-06	2.1e-05	6.0e-04	1.1e-03
Ba-133	5.0e-04	1.9e-05	2.7e-04	1.4e-03	1.9e-03	9.9e-05	3.8e-06	5.3e-05	2.7e-04	3.6e-04
Ce-139	1.4e-04	5.6e-06	7.6e-05	3.9e-04	5.3e-04	2.8e-05	1.1e-06	1.5e-05	7.7e-05	1.0e-04
Ce-141	2.1e-04	8.5e-06	1.1e-04	5.7e-04	7.8e-04	4.2e-05	1.7e-06	2.1e-05	1.1e-04	1.5e-04
Ce-144	2.9e-03	1.1e-04	1.5e-03	7.9e-03	1.1e-02	5.7e-04	2.2e-05	3.0e-04	1.6e-03	2.1e-03
Pm-147	1.5e-04	5.9e-06	8.0e-05	4.2e-04	5.6e-04	3.0e-05	1.2e-06	1.6e-05	8.2e-05	1.1e-04

Table F1.42 Normalized effective dose equivalents from ingestion: Slag truck driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.8e-05	2.2e-06	3.1e-05	1.6e-04	2.2e-04	1.1e-05	4.4e-07	6.1e-06	3.1e-05	4.2e-05
Eu-152	9.6e-04	3.7e-05	5.1e-04	2.6e-03	3.5e-03	1.9e-04	7.3e-06	1.0e-04	5.2e-04	6.9e-04
Eu-154	1.4e-03	5.5e-05	7.5e-04	3.9e-03	5.2e-03	2.8e-04	1.1e-05	1.5e-04	7.6e-04	1.0e-03
Eu-155	2.2e-04	8.7e-06	1.2e-04	6.2e-04	8.3e-04	4.4e-05	1.7e-06	2.4e-05	1.2e-04	1.6e-04
Gd-153	1.6e-04	6.2e-06	8.4e-05	4.3e-04	5.9e-04	3.1e-05	1.2e-06	1.7e-05	8.5e-05	1.1e-04
Tb-160	7.2e-04	2.8e-05	3.8e-04	2.0e-03	2.7e-03	1.4e-04	5.6e-06	7.6e-05	3.9e-04	5.2e-04
Tm-170	6.5e-04	2.6e-05	3.5e-04	1.8e-03	2.4e-03	1.3e-04	5.1e-06	6.9e-05	3.5e-04	4.7e-04
Tm-171	6.2e-05	2.4e-06	3.3e-05	1.7e-04	2.3e-04	1.2e-05	4.7e-07	6.5e-06	3.3e-05	4.4e-05
Ta-182	7.9e-04	3.1e-05	4.2e-04	2.2e-03	2.9e-03	1.5e-04	6.1e-06	8.2e-05	4.2e-04	5.7e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.0e-01	7.7e-03	1.1e-01	5.5e-01	7.4e-01	3.9e-02	1.5e-03	2.1e-02	1.1e-01	1.4e-01
Ra-228	2.2e-01	8.3e-03	1.1e-01	5.9e-01	8.0e-01	4.2e-02	1.6e-03	2.3e-02	1.2e-01	1.6e-01
Ac-227	2.2e+00	8.4e-02	1.2e+00	6.0e+00	8.1e+00	4.3e-01	1.7e-02	2.3e-01	1.2e+00	1.6e+00
Th-228	1.2e-01	4.5e-03	6.2e-02	3.2e-01	4.3e-01	2.3e-02	8.9e-04	1.2e-02	6.3e-02	8.4e-02
Th-229	6.0e-01	2.3e-02	3.2e-01	1.6e+00	2.2e+00	1.2e-01	4.5e-03	6.3e-02	3.2e-01	4.3e-01
Th-230	8.1e-02	3.1e-03	4.3e-02	2.2e-01	3.0e-01	1.6e-02	6.2e-04	8.6e-03	4.4e-02	5.9e-02
Th-232	4.1e-01	1.6e-02	2.2e-01	1.1e+00	1.5e+00	8.0e-02	3.1e-03	4.3e-02	2.2e-01	2.9e-01
Pa-231	1.6e+00	6.1e-02	8.4e-01	4.3e+00	5.9e+00	3.1e-01	1.2e-02	1.7e-01	8.6e-01	1.1e+00
U-232	1.4e-02	5.4e-04	7.6e-03	3.9e-02	5.4e-02	2.8e-03	1.0e-04	1.5e-03	7.7e-03	1.0e-02
U-233	3.9e-03	1.5e-04	2.1e-03	1.1e-02	1.5e-02	7.7e-04	3.0e-05	4.2e-04	2.1e-03	2.9e-03
U-234	3.9e-03	1.5e-04	2.1e-03	1.1e-02	1.4e-02	7.6e-04	2.9e-05	4.1e-04	2.1e-03	2.8e-03
U-235	4.2e-03	1.6e-04	2.2e-03	1.1e-02	1.6e-02	8.2e-04	3.2e-05	4.4e-04	2.3e-03	3.0e-03
U-236	3.7e-03	1.4e-04	1.9e-03	1.0e-02	1.4e-02	7.2e-04	2.8e-05	3.9e-04	2.0e-03	2.7e-03
U-238	5.6e-03	2.1e-04	2.9e-03	1.5e-02	2.1e-02	1.1e-03	4.2e-05	5.9e-04	3.0e-03	4.0e-03
Np-237	6.6e-01	2.6e-02	3.5e-01	1.8e+00	2.4e+00	1.3e-01	5.0e-03	7.0e-02	3.6e-01	4.8e-01
Pu-236	1.7e-01	6.6e-03	9.0e-02	4.6e-01	6.3e-01	3.3e-02	1.3e-03	1.8e-02	9.1e-02	1.2e-01
Pu-238	4.8e-01	1.8e-02	2.5e-01	1.3e+00	1.8e+00	9.4e-02	3.6e-03	5.0e-02	2.6e-01	3.4e-01
Pu-239	5.3e-01	2.0e-02	2.8e-01	1.4e+00	2.0e+00	1.0e-01	4.0e-03	5.5e-02	2.8e-01	3.8e-01
Pu-240	5.3e-01	2.0e-02	2.8e-01	1.4e+00	2.0e+00	1.0e-01	4.0e-03	5.5e-02	2.8e-01	3.8e-01
Pu-241	1.0e-02	3.9e-04	5.4e-03	2.8e-02	3.8e-02	2.0e-03	7.7e-05	1.1e-03	5.5e-03	7.4e-03
Pu-242	5.0e-01	1.9e-02	2.6e-01	1.4e+00	1.9e+00	9.8e-02	3.8e-03	5.3e-02	2.7e-01	3.6e-01
Pu-244	4.9e-01	1.9e-02	2.6e-01	1.4e+00	1.8e+00	9.7e-02	3.7e-03	5.2e-02	2.7e-01	3.6e-01
Am-241	5.4e-01	2.1e-02	2.9e-01	1.5e+00	2.0e+00	1.1e-01	4.1e-03	5.7e-02	2.9e-01	3.9e-01
Am-242m	5.4e-01	2.1e-02	2.8e-01	1.5e+00	2.0e+00	1.1e-01	4.1e-03	5.7e-02	2.9e-01	3.9e-01
Am-243	5.4e-01	2.1e-02	2.9e-01	1.5e+00	2.0e+00	1.1e-01	4.1e-03	5.7e-02	2.9e-01	3.9e-01
Cm-242	1.5e-02	5.9e-04	8.0e-03	4.1e-02	5.6e-02	3.0e-03	1.2e-04	1.6e-03	8.1e-03	1.1e-02
Cm-243	3.7e-01	1.4e-02	2.0e-01	1.0e+00	1.4e+00	7.3e-02	2.8e-03	3.9e-02	2.0e-01	2.7e-01
Cm-244	3.0e-01	1.2e-02	1.6e-01	8.2e-01	1.1e+00	5.9e-02	2.3e-03	3.2e-02	1.6e-01	2.2e-01
Cm-245	5.6e-01	2.1e-02	2.9e-01	1.5e+00	2.1e+00	1.1e-01	4.2e-03	5.9e-02	3.0e-01	4.0e-01
Cm-246	5.5e-01	2.1e-02	2.9e-01	1.5e+00	2.0e+00	1.1e-01	4.2e-03	5.8e-02	3.0e-01	4.0e-01
Cm-247	5.1e-01	2.0e-02	2.7e-01	1.4e+00	1.9e+00	1.0e-01	3.9e-03	5.4e-02	2.7e-01	3.7e-01
Cm-248	2.0e+00	7.8e-02	1.1e+00	5.6e+00	7.5e+00	4.0e-01	1.5e-02	2.1e-01	1.1e+00	1.5e+00
Bk-249	1.8e-03	6.9e-05	9.4e-04	4.9e-03	6.6e-03	3.5e-04	1.3e-05	1.9e-04	9.6e-04	1.3e-03
Cf-248	4.7e-02	1.8e-03	2.5e-02	1.3e-01	1.8e-01	9.3e-03	3.7e-04	5.0e-03	2.5e-02	3.4e-02
Cf-249	7.0e-01	2.7e-02	3.7e-01	1.9e+00	2.6e+00	1.4e-01	5.3e-03	7.4e-02	3.8e-01	5.1e-01
Cf-250	3.2e-01	1.2e-02	1.7e-01	8.6e-01	1.2e+00	6.2e-02	2.4e-03	3.3e-02	1.7e-01	2.3e-01
Cf-251	7.2e-01	2.8e-02	3.8e-01	2.0e+00	2.7e+00	1.4e-01	5.4e-03	7.6e-02	3.9e-01	5.2e-01
Cf-252	1.6e-01	6.1e-03	8.3e-02	4.3e-01	5.8e-01	3.1e-02	1.2e-03	1.7e-02	8.5e-02	1.1e-01
Cf-254	2.4e-01	9.6e-03	1.3e-01	6.7e-01	9.0e-01	4.8e-02	1.9e-03	2.5e-02	1.3e-01	1.8e-01
Es-254	4.4e-02	1.7e-03	2.3e-02	1.2e-01	1.7e-01	8.7e-03	3.4e-04	4.7e-03	2.4e-02	3.2e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.43 Normalized effective dose equivalents from all pathways: EAF dust-bulk trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	6.1e+00	1.8e+00	4.1e+00	1.2e+01	1.8e+01	1.2e+00	3.6e-01	8.0e-01	2.3e+00	3.5e+00
P-32	1.2e-04	1.4e-05	6.7e-05	2.5e-04	3.7e-04	2.3e-05	2.8e-06	1.3e-05	5.0e-05	7.5e-05
S-35	9.5e-08	2.2e-08	6.2e-08	1.9e-07	2.8e-07	1.9e-08	4.3e-09	1.2e-08	3.8e-08	5.5e-08
Cl-36	7.5e-04	1.2e-04	4.8e-04	1.5e-03	2.2e-03	1.5e-04	2.4e-05	9.4e-05	3.0e-04	4.3e-04
K-40	4.7e-01	1.4e-01	3.1e-01	8.9e-01	1.3e+00	9.2e-02	2.8e-02	6.1e-02	1.8e-01	2.6e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.3e-06	3.3e-07	8.4e-07	2.5e-06	3.8e-06	2.5e-07	6.6e-08	1.7e-07	4.9e-07	7.5e-07
Sc-46	4.4e-01	1.1e-01	2.9e-01	8.7e-01	1.3e+00	8.6e-02	2.3e-02	5.8e-02	1.7e-01	2.6e-01
Cr-51	1.6e-03	3.1e-04	1.0e-03	3.4e-03	5.0e-03	3.2e-04	6.2e-05	2.0e-04	6.6e-04	9.7e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.6e-01	4.7e-02	1.1e-01	3.1e-01	4.7e-01	3.2e-02	9.6e-03	2.1e-02	6.1e-02	9.3e-02
Fe-55	3.9e-12	9.5e-13	2.6e-12	7.8e-12	1.2e-11	7.8e-13	1.9e-13	5.1e-13	1.5e-12	2.3e-12
Fe-59	5.4e-02	1.2e-02	3.5e-02	1.1e-01	1.6e-01	1.1e-02	2.4e-03	6.9e-03	2.1e-02	3.1e-02
Co-56	2.0e-01	4.8e-02	1.3e-01	4.0e-01	6.0e-01	4.0e-02	9.6e-03	2.6e-02	7.8e-02	1.2e-01
Co-57	2.7e-03	6.6e-04	1.8e-03	5.4e-03	8.1e-03	5.4e-04	1.3e-04	3.5e-04	1.1e-03	1.6e-03
Co-58	5.2e-02	1.2e-02	3.3e-02	1.0e-01	1.5e-01	1.0e-02	2.4e-03	6.6e-03	2.0e-02	3.0e-02
Co-60	1.9e-01	4.6e-02	1.2e-01	3.8e-01	5.6e-01	3.7e-02	9.2e-03	2.4e-02	7.3e-02	1.1e-01
Ni-59	1.1e-06	2.7e-07	7.5e-07	2.2e-06	3.3e-06	2.2e-07	5.4e-08	1.5e-07	4.5e-07	6.4e-07
Ni-63	1.4e-10	3.4e-11	9.4e-11	2.8e-10	4.1e-10	2.8e-11	6.8e-12	1.8e-11	5.6e-11	8.0e-11
Zn-65	2.9e+00	8.5e-01	1.9e+00	5.5e+00	8.3e+00	5.6e-01	1.7e-01	3.8e-01	1.1e+00	1.7e+00
As-73	2.5e-04	5.9e-05	1.6e-04	5.0e-04	7.4e-04	4.9e-05	1.2e-05	3.2e-05	9.7e-05	1.4e-04
Se-75	1.2e+00	3.5e-01	7.8e-01	2.3e+00	3.4e+00	2.3e-01	7.0e-02	1.5e-01	4.4e-01	6.7e-01
Sr-85	9.1e-02	2.3e-02	5.9e-02	1.8e-01	2.6e-01	1.8e-02	4.7e-03	1.2e-02	3.5e-02	5.3e-02
Sr-89	3.6e-04	8.9e-05	2.3e-04	7.2e-04	1.1e-03	7.1e-05	1.8e-05	4.6e-05	1.4e-04	2.1e-04
Sr-90	1.7e-03	4.4e-04	1.1e-03	3.3e-03	4.8e-03	3.3e-04	8.9e-05	2.2e-04	6.5e-04	9.7e-04
Y-91	1.1e-03	2.8e-04	7.3e-04	2.2e-03	3.3e-03	2.2e-04	5.6e-05	1.4e-04	4.3e-04	6.5e-04
Zr-93	6.5e-10	1.7e-10	4.4e-10	1.3e-09	1.9e-09	1.3e-10	3.5e-11	8.7e-11	2.5e-10	3.8e-10
Zr-95	2.3e-01	6.0e-02	1.5e-01	4.3e-01	6.6e-01	4.4e-02	1.2e-02	3.0e-02	8.6e-02	1.3e-01
Nb-93m	4.7e-11	1.2e-11	3.1e-11	9.0e-11	1.4e-10	9.2e-12	2.4e-12	6.2e-12	1.8e-11	2.7e-11
Nb-94	4.4e-01	1.1e-01	2.9e-01	8.4e-01	1.3e+00	8.6e-02	2.3e-02	5.8e-02	1.7e-01	2.5e-01
Nb-95	1.1e-01	2.5e-02	7.4e-02	2.3e-01	3.4e-01	2.2e-02	5.0e-03	1.4e-02	4.5e-02	6.7e-02
Mo-93	2.6e-12	6.3e-13	1.7e-12	5.1e-12	7.5e-12	5.0e-13	1.3e-13	3.3e-13	9.9e-13	1.5e-12
Tc-97	2.1e-11	5.0e-12	1.4e-11	4.2e-11	6.2e-11	4.1e-12	1.0e-12	2.7e-12	8.3e-12	1.2e-11
Tc-97m	3.5e-06	8.0e-07	2.2e-06	7.0e-06	1.0e-05	6.8e-07	1.6e-07	4.5e-07	1.4e-06	2.0e-06
Tc-99	9.3e-07	2.2e-07	6.1e-07	1.9e-06	2.7e-06	1.8e-07	4.5e-08	1.2e-07	3.7e-07	5.3e-07
Ru-103	1.9e-02	4.2e-03	1.3e-02	3.9e-02	5.6e-02	3.8e-03	8.4e-04	2.5e-03	7.8e-03	1.1e-02
Ru-106	1.5e-02	3.6e-03	9.9e-03	3.0e-02	4.4e-02	3.0e-03	7.1e-04	2.0e-03	5.8e-03	8.5e-03
Ag-108m	1.4e+00	2.6e-01	8.8e-01	2.8e+00	4.0e+00	2.7e-01	5.3e-02	1.7e-01	5.5e-01	7.9e-01
Ag-110m	2.2e+00	4.2e-01	1.4e+00	4.4e+00	6.3e+00	4.3e-01	8.5e-02	2.8e-01	8.8e-01	1.3e+00
Cd-109	2.7e-03	8.1e-04	1.8e-03	5.1e-03	7.9e-03	5.3e-04	1.6e-04	3.6e-04	1.0e-03	1.6e-03
Sn-113	1.4e-02	3.2e-03	9.1e-03	2.8e-02	4.1e-02	2.7e-03	6.7e-04	1.8e-03	5.5e-03	8.1e-03
Sb-124	9.2e-01	1.7e-01	5.9e-01	1.9e+00	2.8e+00	1.8e-01	3.4e-02	1.2e-01	3.7e-01	5.5e-01
Sb-125	2.8e-01	5.2e-02	1.8e-01	5.6e-01	8.4e-01	5.4e-02	1.1e-02	3.5e-02	1.1e-01	1.6e-01
Te-123m	2.9e-01	8.6e-02	1.9e-01	5.6e-01	8.4e-01	5.7e-02	1.7e-02	3.8e-02	1.1e-01	1.7e-01
Te-127m	2.0e-02	5.9e-03	1.3e-02	3.8e-02	5.8e-02	3.9e-03	1.2e-03	2.6e-03	7.5e-03	1.1e-02
I-125	1.8e-05	2.8e-06	1.2e-05	3.8e-05	5.7e-05	3.6e-06	5.5e-07	2.3e-06	7.5e-06	1.1e-05
I-129	5.0e-05	7.8e-06	3.2e-05	1.1e-04	1.5e-04	9.8e-06	1.6e-06	6.4e-06	2.0e-05	3.0e-05
I-131	4.5e-02	1.3e-03	1.5e-02	1.1e-01	1.8e-01	8.8e-03	2.5e-04	3.0e-03	2.2e-02	3.5e-02
Cs-134	8.3e+00	2.5e+00	5.6e+00	1.6e+01	2.4e+01	1.6e+00	5.0e-01	1.1e+00	3.1e+00	4.8e+00
Cs-135	8.6e-05	2.6e-05	5.8e-05	1.6e-04	2.5e-04	1.7e-05	5.1e-06	1.1e-05	3.2e-05	5.0e-05
Cs-137	3.1e+00	9.2e-01	2.1e+00	5.9e+00	9.1e+00	6.1e-01	1.8e-01	4.1e-01	1.2e+00	1.8e+00
Ba-133	8.0e-02	2.1e-02	5.3e-02	1.6e-01	2.4e-01	1.6e-02	4.3e-03	1.1e-02	3.1e-02	4.7e-02
Ce-139	1.6e-02	4.2e-03	1.0e-02	3.1e-02	4.7e-02	3.1e-03	8.4e-04	2.1e-03	6.2e-03	9.1e-03
Ce-141	4.2e-03	9.4e-04	2.7e-03	8.5e-03	1.2e-02	8.3e-04	1.9e-04	5.3e-04	1.7e-03	2.5e-03
Ce-144	1.2e-02	3.1e-03	7.7e-03	2.3e-02	3.4e-02	2.3e-03	6.3e-04	1.5e-03	4.5e-03	6.8e-03
Pm-147	9.8e-07	2.6e-07	6.5e-07	1.9e-06	2.9e-06	1.9e-07	5.2e-08	1.3e-07	3.8e-07	5.6e-07

Table F1.43 Normalized effective dose equivalents from all pathways: EAF dust–bulk trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.5e-09	3.9e-10	9.9e-10	2.9e-09	4.4e-09	2.9e-10	7.8e-11	1.9e-10	5.6e-10	8.6e-10
Eu-152	3.2e-01	6.2e-02	2.1e-01	6.2e-01	9.4e-01	6.2e-02	1.6e-02	4.1e-02	1.2e-01	1.8e-01
Eu-154	3.1e-01	8.0e-02	2.0e-01	6.0e-01	9.2e-01	6.0e-02	1.6e-02	4.0e-02	1.2e-01	1.8e-01
Eu-155	2.6e-03	6.9e-04	1.7e-03	5.1e-03	7.9e-03	5.2e-04	1.4e-04	3.4e-04	1.0e-03	1.5e-03
Gd-153	3.0e-03	7.9e-04	2.0e-03	5.8e-03	8.8e-03	5.9e-04	1.6e-04	3.9e-04	1.1e-03	1.7e-03
Tb-160	2.3e-01	5.7e-02	1.5e-01	4.4e-01	6.6e-01	4.4e-02	1.1e-02	2.8e-02	8.7e-02	1.3e-01
Tm-170	1.8e-04	4.5e-05	1.2e-04	3.6e-04	5.3e-04	3.5e-05	9.6e-06	2.4e-05	7.0e-05	1.1e-04
Tm-171	5.9e-06	1.6e-06	3.9e-06	1.2e-05	1.7e-05	1.2e-06	3.2e-07	7.8e-07	2.3e-06	3.4e-06
Ta-182	2.9e-01	7.4e-02	1.9e-01	5.6e-01	8.6e-01	5.6e-02	1.5e-02	3.7e-02	1.1e-01	1.7e-01
W-181	1.1e-04	2.5e-05	7.0e-05	2.1e-04	3.1e-04	2.1e-05	5.1e-06	1.4e-05	4.1e-05	6.0e-05
W-185	2.3e-06	5.4e-07	1.5e-06	4.5e-06	6.7e-06	4.6e-07	1.1e-07	3.0e-07	8.9e-07	1.3e-06
Os-185	2.7e+00	8.0e-01	1.8e+00	5.3e+00	7.9e+00	5.4e-01	1.6e-01	3.6e-01	1.0e+00	1.6e+00
Ir-192	3.9e-02	9.0e-03	2.6e-02	7.7e-02	1.1e-01	7.6e-03	1.8e-03	5.0e-03	1.5e-02	2.2e-02
Tl-204	1.8e-03	5.4e-04	1.2e-03	3.5e-03	5.3e-03	3.5e-04	1.1e-04	2.4e-04	6.8e-04	1.0e-03
Pb-210	4.3e-03	1.3e-03	2.9e-03	8.3e-03	1.3e-02	8.5e-04	2.6e-04	5.7e-04	1.6e-03	2.5e-03
Bi-207	8.1e+00	2.4e+00	5.5e+00	1.6e+01	2.4e+01	1.6e+00	4.9e-01	1.1e+00	3.1e+00	4.7e+00
Po-210	4.5e-05	1.4e-05	3.0e-05	8.7e-05	1.3e-04	8.9e-06	2.7e-06	6.0e-06	1.7e-05	2.6e-05
Ra-226	4.9e-01	1.3e-01	3.2e-01	9.6e-01	1.4e+00	9.6e-02	2.6e-02	6.4e-02	1.9e-01	2.8e-01
Ra-228	2.5e-01	6.5e-02	1.7e-01	4.9e-01	7.3e-01	5.0e-02	1.3e-02	3.3e-02	9.7e-02	1.4e-01
Ac-227	8.4e-02	2.2e-02	5.6e-02	1.6e-01	2.5e-01	1.7e-02	4.5e-03	1.1e-02	3.2e-02	4.8e-02
Th-228	3.9e-01	1.0e-01	2.5e-01	7.6e-01	1.1e+00	7.7e-02	2.0e-02	5.0e-02	1.5e-01	2.3e-01
Th-229	5.9e-02	1.5e-02	3.9e-02	1.1e-01	1.7e-01	1.2e-02	3.1e-03	7.6e-03	2.3e-02	3.4e-02
Th-230	4.3e-05	1.0e-05	2.8e-05	8.6e-05	1.3e-04	8.5e-06	2.1e-06	5.6e-06	1.7e-05	2.5e-05
Th-232	2.8e-03	4.8e-04	1.8e-03	5.8e-03	8.7e-03	5.6e-04	9.4e-05	3.5e-04	1.1e-03	1.7e-03
Pa-231	7.2e-03	1.9e-03	4.7e-03	1.4e-02	2.1e-02	1.4e-03	3.9e-04	9.4e-04	2.8e-03	4.2e-03
U-232	1.4e-02	2.3e-03	8.7e-03	2.8e-02	4.2e-02	2.7e-03	4.6e-04	1.7e-03	5.5e-03	8.1e-03
U-233	3.0e-05	6.2e-06	2.0e-05	6.0e-05	8.9e-05	6.0e-06	1.7e-06	4.0e-06	1.2e-05	1.8e-05
U-234	5.4e-06	1.4e-06	3.6e-06	1.1e-05	1.6e-05	1.1e-06	2.9e-07	7.0e-07	2.1e-06	3.1e-06
U-235	2.5e-02	6.6e-03	1.6e-02	4.9e-02	7.2e-02	4.9e-03	1.3e-03	3.2e-03	9.5e-03	1.4e-02
U-236	2.1e-06	5.7e-07	1.4e-06	4.2e-06	6.2e-06	4.2e-07	1.1e-07	2.7e-07	8.1e-07	1.2e-06
U-238	6.7e-03	1.8e-03	4.4e-03	1.3e-02	2.0e-02	1.3e-03	3.6e-04	8.7e-04	2.6e-03	3.9e-03
Np-237	4.4e-02	1.1e-02	2.9e-02	8.9e-02	1.3e-01	8.7e-03	2.8e-03	5.8e-03	1.7e-02	2.5e-02
Pu-236	9.6e-06	1.3e-06	5.7e-06	2.1e-05	3.0e-05	1.9e-06	2.6e-07	1.1e-06	4.0e-06	5.9e-06
Pu-238	7.7e-07	2.0e-07	5.2e-07	1.5e-06	2.2e-06	1.5e-07	4.0e-08	1.0e-07	3.0e-07	4.3e-07
Pu-239	8.5e-06	2.2e-06	5.7e-06	1.6e-05	2.4e-05	1.7e-06	4.5e-07	1.1e-06	3.3e-06	4.8e-06
Pu-240	7.0e-07	1.8e-07	4.7e-07	1.4e-06	2.0e-06	1.4e-07	3.7e-08	9.3e-08	2.7e-07	4.0e-07
Pu-241	1.5e-07	3.8e-08	1.0e-07	2.9e-07	4.4e-07	3.0e-08	7.8e-09	2.0e-08	5.7e-08	8.5e-08
Pu-242	6.9e-07	1.8e-07	4.6e-07	1.3e-06	2.0e-06	1.4e-07	3.6e-08	9.1e-08	2.6e-07	3.9e-07
Pu-244	8.8e-02	2.3e-02	5.9e-02	1.7e-01	2.6e-01	1.7e-02	4.7e-03	1.2e-02	3.4e-02	5.0e-02
Am-241	2.8e-04	7.4e-05	1.9e-04	5.6e-04	8.5e-04	5.6e-05	1.5e-05	3.7e-05	1.1e-04	1.7e-04
Am-242m	1.8e-03	4.6e-04	1.2e-03	3.5e-03	5.3e-03	3.5e-04	9.4e-05	2.3e-04	6.8e-04	1.0e-03
Am-243	2.6e-02	6.8e-03	1.7e-02	5.1e-02	7.7e-02	5.1e-03	1.4e-03	3.4e-03	1.0e-02	1.5e-02
Cm-242	8.1e-07	2.1e-07	5.4e-07	1.5e-06	2.4e-06	1.6e-07	4.3e-08	1.1e-07	3.1e-07	4.6e-07
Cm-243	1.9e-02	4.9e-03	1.2e-02	3.6e-02	5.4e-02	3.6e-03	9.9e-04	2.4e-03	7.1e-03	1.1e-02
Cm-244	7.9e-07	2.1e-07	5.3e-07	1.5e-06	2.3e-06	1.6e-07	4.2e-08	1.0e-07	3.0e-07	4.5e-07
Cm-245	8.1e-03	2.1e-03	5.4e-03	1.6e-02	2.4e-02	1.6e-03	4.3e-04	1.1e-03	3.1e-03	4.6e-03
Cm-246	3.8e-08	1.0e-08	2.5e-08	7.4e-08	1.1e-07	7.5e-09	2.0e-09	5.0e-09	1.4e-08	2.2e-08
Cm-247	7.9e-02	2.1e-02	5.3e-02	1.5e-01	2.3e-01	1.6e-02	4.2e-03	1.0e-02	3.0e-02	4.5e-02
Cm-248	3.2e-08	8.6e-09	2.2e-08	6.3e-08	9.5e-08	6.4e-09	1.7e-09	4.3e-09	1.2e-08	1.9e-08
Bk-249	1.4e-05	2.5e-06	9.2e-06	3.0e-05	4.3e-05	2.8e-06	4.9e-07	1.8e-06	5.8e-06	8.5e-06
Cf-248	1.1e-06	2.8e-07	7.1e-07	2.1e-06	3.1e-06	2.1e-07	5.7e-08	1.4e-07	4.2e-07	6.0e-07
Cf-249	7.9e-02	2.1e-02	5.2e-02	1.6e-01	2.3e-01	1.5e-02	4.1e-03	1.0e-02	3.1e-02	4.4e-02
Cf-250	1.8e-08	4.9e-09	1.2e-08	3.6e-08	5.3e-08	3.6e-09	9.7e-10	2.4e-09	7.2e-09	1.0e-08
Cf-251	1.4e-02	3.7e-03	9.2e-03	2.7e-02	4.0e-02	2.7e-03	7.3e-04	1.8e-03	5.5e-03	7.8e-03
Cf-252	1.2e-06	3.2e-07	7.9e-07	2.4e-06	3.4e-06	2.4e-07	6.3e-08	1.6e-07	4.7e-07	6.7e-07
Cf-254	3.4e+00	8.6e-01	2.2e+00	6.7e+00	9.9e+00	6.7e-01	1.7e-01	4.4e-01	1.3e+00	1.9e+00
Es-254	2.3e-01	6.2e-02	1.6e-01	4.7e-01	6.8e-01	4.6e-02	1.2e-02	3.1e-02	9.1e-02	1.4e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.44 Normalized effective dose equivalents from all pathways: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.2e+01	9.4e+00	2.2e+01	6.3e+01	9.9e+01	6.3e+00	1.9e+00	4.3e+00	1.2e+01	1.9e+01
P-32	5.9e-04	7.2e-05	3.4e-04	1.4e-03	1.9e-03	1.2e-04	1.5e-05	6.8e-05	2.7e-04	3.7e-04
S-35	4.9e-06	7.1e-07	2.8e-06	1.2e-05	1.6e-05	9.7e-07	1.4e-07	5.5e-07	2.2e-06	3.1e-06
Cl-36	4.1e-03	6.6e-04	2.6e-03	8.4e-03	1.1e-02	8.1e-04	1.3e-04	5.2e-04	1.7e-03	2.2e-03
K-40	2.5e+00	7.3e-01	1.7e+00	4.9e+00	8.0e+00	4.9e-01	1.5e-01	3.3e-01	9.6e-01	1.5e+00
Ca-41	1.0e-05	1.2e-06	6.4e-06	2.4e-05	3.7e-05	2.1e-06	2.4e-07	1.2e-06	4.6e-06	7.3e-06
Ca-45	3.7e-05	6.2e-06	2.3e-05	8.5e-05	1.2e-04	7.3e-06	1.3e-06	4.6e-06	1.7e-05	2.4e-05
Sc-46	2.3e+00	5.9e-01	1.5e+00	4.5e+00	7.0e+00	4.5e-01	1.2e-01	3.0e-01	9.1e-01	1.4e+00
Cr-51	8.2e-03	1.4e-03	5.3e-03	1.6e-02	2.4e-02	1.6e-03	2.9e-04	1.1e-03	3.2e-03	4.8e-03
Mn-53	1.5e-06	2.2e-07	8.7e-07	3.6e-06	5.2e-06	2.9e-07	4.4e-08	1.7e-07	6.9e-07	9.6e-07
Mn-54	8.5e-01	2.4e-01	5.6e-01	1.7e+00	2.5e+00	1.7e-01	5.0e-02	1.1e-01	3.3e-01	5.2e-01
Fe-55	1.8e-06	2.3e-07	1.0e-06	3.9e-06	5.9e-06	3.5e-07	4.6e-08	2.0e-07	7.8e-07	1.2e-06
Fe-59	2.8e-01	6.3e-02	1.8e-01	5.7e-01	8.7e-01	5.4e-02	1.2e-02	3.6e-02	1.1e-01	1.8e-01
Co-56	1.0e+00	2.4e-01	6.9e-01	2.1e+00	2.9e+00	2.1e-01	4.7e-02	1.4e-01	4.3e-01	5.7e-01
Co-57	1.4e-02	3.2e-03	8.8e-03	2.8e-02	3.8e-02	2.7e-03	6.3e-04	1.8e-03	5.5e-03	7.4e-03
Co-58	2.7e-01	6.1e-02	1.8e-01	5.5e-01	7.6e-01	5.2e-02	1.2e-02	3.5e-02	1.1e-01	1.5e-01
Co-60	9.9e-01	2.3e-01	6.5e-01	2.1e+00	2.7e+00	2.0e-01	4.6e-02	1.3e-01	4.0e-01	5.6e-01
Ni-59	6.8e-06	1.5e-06	4.5e-06	1.4e-05	2.0e-05	1.3e-06	3.1e-07	8.9e-07	2.8e-06	4.0e-06
Ni-63	2.5e-06	3.3e-07	1.4e-06	5.9e-06	8.9e-06	4.9e-07	6.6e-08	2.8e-07	1.2e-06	1.8e-06
Zn-65	1.5e+01	4.5e+00	1.0e+01	3.0e+01	4.7e+01	3.0e+00	9.0e-01	2.0e+00	5.9e+00	8.8e+00
As-73	1.6e-03	3.3e-04	1.0e-03	3.3e-03	4.5e-03	3.1e-04	7.0e-05	2.0e-04	6.3e-04	9.1e-04
Se-75	5.9e+00	1.7e+00	4.0e+00	1.1e+01	1.8e+01	1.2e+00	3.5e-01	7.9e-01	2.2e+00	3.4e+00
Sr-85	4.7e-01	1.1e-01	3.1e-01	9.6e-01	1.4e+00	9.2e-02	2.4e-02	6.3e-02	1.9e-01	2.7e-01
Sr-89	1.9e-03	4.4e-04	1.3e-03	3.9e-03	5.5e-03	3.7e-04	9.2e-05	2.5e-04	7.5e-04	1.1e-03
Sr-90	1.0e-02	2.7e-03	6.7e-03	2.0e-02	2.9e-02	2.0e-03	5.2e-04	1.3e-03	4.0e-03	5.8e-03
Y-91	5.8e-03	1.5e-03	3.8e-03	1.2e-02	1.7e-02	1.1e-03	2.9e-04	7.5e-04	2.2e-03	3.3e-03
Zr-93	2.6e-04	3.1e-05	1.4e-04	5.8e-04	9.4e-04	5.1e-05	6.4e-06	2.8e-05	1.2e-04	1.9e-04
Zr-95	1.2e+00	3.2e-01	7.9e-01	2.2e+00	3.5e+00	2.4e-01	6.1e-02	1.5e-01	4.5e-01	6.4e-01
Nb-93m	8.7e-05	1.0e-05	4.7e-05	2.0e-04	2.9e-04	1.7e-05	1.9e-06	9.5e-06	4.0e-05	5.7e-05
Nb-94	2.3e+00	5.9e-01	1.5e+00	4.4e+00	6.7e+00	4.5e-01	1.2e-01	3.0e-01	8.8e-01	1.4e+00
Nb-95	5.8e-01	1.2e-01	3.9e-01	1.2e+00	1.7e+00	1.1e-01	2.4e-02	7.6e-02	2.3e-01	3.4e-01
Mo-93	2.5e-05	2.9e-06	1.3e-05	5.7e-05	8.7e-05	4.8e-06	6.1e-07	2.7e-06	1.2e-05	1.8e-05
Tc-97	9.9e-07	1.2e-07	5.5e-07	2.3e-06	3.2e-06	2.0e-07	2.5e-08	1.1e-07	4.5e-07	6.4e-07
Tc-97m	2.1e-05	4.9e-06	1.4e-05	4.3e-05	6.6e-05	4.2e-06	9.7e-07	2.7e-06	8.9e-06	1.3e-05
Tc-99	1.3e-05	2.4e-06	8.1e-06	2.9e-05	4.2e-05	2.6e-06	5.0e-07	1.6e-06	5.5e-06	8.2e-06
Ru-103	1.0e-01	2.2e-02	6.4e-02	2.0e-01	3.2e-01	2.0e-02	4.5e-03	1.3e-02	3.9e-02	6.0e-02
Ru-106	7.9e-02	1.8e-02	5.3e-02	1.6e-01	2.2e-01	1.6e-02	3.7e-03	1.0e-02	3.0e-02	4.4e-02
Ag-108m	7.1e+00	1.4e+00	4.5e+00	1.4e+01	2.2e+01	1.4e+00	2.8e-01	9.1e-01	2.8e+00	4.5e+00
Ag-110m	1.1e+01	2.2e+00	7.4e+00	2.3e+01	3.6e+01	2.3e+00	4.5e-01	1.5e+00	4.4e+00	7.2e+00
Cd-109	1.8e-02	5.2e-03	1.2e-02	3.5e-02	5.4e-02	3.5e-03	1.0e-03	2.3e-03	7.0e-03	1.0e-02
Sn-113	7.0e-02	1.6e-02	4.7e-02	1.4e-01	2.1e-01	1.4e-02	3.1e-03	9.2e-03	2.8e-02	4.0e-02
Sb-124	4.7e+00	9.1e-01	2.9e+00	9.8e+00	1.5e+01	9.3e-01	1.8e-01	5.8e-01	2.0e+00	2.9e+00
Sb-125	1.4e+00	2.6e-01	8.8e-01	2.8e+00	4.2e+00	2.8e-01	5.5e-02	1.8e-01	5.5e-01	8.7e-01
Te-123m	1.5e+00	4.2e-01	9.8e-01	2.8e+00	4.5e+00	2.9e-01	8.6e-02	1.9e-01	5.5e-01	8.3e-01
Te-127m	1.0e-01	3.0e-02	7.1e-02	2.0e-01	3.2e-01	2.1e-02	6.1e-03	1.4e-02	4.0e-02	6.0e-02
I-125	1.0e-03	1.0e-04	5.8e-04	2.2e-03	3.5e-03	2.0e-04	2.1e-05	1.1e-04	4.3e-04	7.0e-04
I-129	9.4e-03	7.8e-04	5.0e-03	2.2e-02	3.3e-02	1.9e-03	1.6e-04	9.7e-04	4.3e-03	6.6e-03
I-131	2.3e-01	8.0e-03	7.0e-02	5.4e-01	8.9e-01	4.4e-02	1.3e-03	1.4e-02	1.1e-01	1.7e-01
Cs-134	4.4e+01	1.3e+01	3.0e+01	8.5e+01	1.3e+02	8.6e+00	2.6e+00	5.8e+00	1.6e+01	2.6e+01
Cs-135	1.4e-03	2.7e-04	8.8e-04	3.0e-03	4.2e-03	2.7e-04	5.4e-05	1.7e-04	5.7e-04	8.0e-04
Cs-137	1.6e+01	4.9e+00	1.1e+01	3.1e+01	5.0e+01	3.2e+00	9.7e-01	2.2e+00	6.1e+00	9.6e+00
Ba-133	4.2e-01	1.1e-01	2.7e-01	7.8e-01	1.2e+00	8.2e-02	2.2e-02	5.3e-02	1.6e-01	2.4e-01
Ce-139	8.0e-02	2.0e-02	5.2e-02	1.6e-01	2.4e-01	1.6e-02	4.0e-03	1.0e-02	3.1e-02	4.8e-02
Ce-141	2.1e-02	4.4e-03	1.4e-02	4.6e-02	6.8e-02	4.1e-03	8.9e-04	2.7e-03	8.6e-03	1.3e-02
Ce-144	6.2e-02	1.6e-02	4.0e-02	1.2e-01	1.9e-01	1.2e-02	3.3e-03	8.1e-03	2.4e-02	3.6e-02
Pm-147	1.2e-04	1.5e-05	6.9e-05	2.6e-04	4.1e-04	2.4e-05	3.1e-06	1.4e-05	5.2e-05	7.9e-05

Table F1.44 Normalized effective dose equivalents from all pathways: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	9.0e-05	1.0e-05	5.0e-05	2.1e-04	3.0e-04	1.8e-05	2.0e-06	9.8e-06	4.1e-05	5.9e-05
Eu-152	1.6e+00	4.4e-01	1.1e+00	3.2e+00	4.9e+00	3.2e-01	8.5e-02	2.1e-01	6.2e-01	9.6e-01
Eu-154	1.6e+00	4.3e-01	1.1e+00	3.2e+00	4.8e+00	3.1e-01	8.3e-02	2.1e-01	6.1e-01	9.4e-01
Eu-155	1.3e-02	3.6e-03	9.2e-03	2.7e-02	4.0e-02	2.7e-03	7.1e-04	1.8e-03	5.2e-03	7.9e-03
Gd-153	1.6e-02	4.0e-03	1.0e-02	3.1e-02	4.4e-02	3.1e-03	8.1e-04	2.1e-03	6.0e-03	8.8e-03
Tb-160	1.2e+00	3.1e-01	7.5e-01	2.4e+00	3.8e+00	2.3e-01	6.0e-02	1.5e-01	4.6e-01	7.8e-01
Tm-170	1.0e-03	2.6e-04	6.8e-04	2.1e-03	3.0e-03	2.0e-04	5.5e-05	1.3e-04	4.1e-04	5.9e-04
Tm-171	6.1e-05	1.4e-05	4.0e-05	1.2e-04	1.9e-04	1.2e-05	2.8e-06	7.7e-06	2.5e-05	3.7e-05
Ta-182	1.5e+00	3.7e-01	9.8e-01	3.1e+00	4.6e+00	2.9e-01	7.8e-02	2.0e-01	5.8e-01	8.9e-01
W-181	5.9e-04	1.4e-04	3.9e-04	1.2e-03	1.8e-03	1.2e-04	2.7e-05	7.8e-05	2.4e-04	3.7e-04
W-185	1.4e-05	3.0e-06	8.9e-06	3.0e-05	4.0e-05	2.7e-06	6.0e-07	1.8e-06	5.6e-06	8.1e-06
Os-185	1.4e+01	4.1e+00	9.6e+00	2.8e+01	4.4e+01	2.8e+00	8.3e-01	1.9e+00	5.5e+00	8.2e+00
Ir-192	1.9e-01	4.5e-02	1.3e-01	4.0e-01	5.7e-01	3.8e-02	8.9e-03	2.5e-02	8.1e-02	1.1e-01
Tl-204	9.8e-03	2.9e-03	6.7e-03	2.0e-02	2.9e-02	1.9e-03	5.9e-04	1.3e-03	3.8e-03	5.8e-03
Pb-210	2.0e+00	3.0e-01	1.2e+00	4.8e+00	6.7e+00	4.0e-01	5.9e-02	2.4e-01	9.6e-01	1.3e+00
Bi-207	4.3e+01	1.3e+01	2.9e+01	8.3e+01	1.3e+02	8.5e+00	2.6e+00	5.8e+00	1.6e+01	2.5e+01
Po-210	5.7e-01	8.6e-02	3.4e-01	1.4e+00	2.0e+00	1.1e-01	1.6e-02	6.6e-02	2.6e-01	3.8e-01
Ra-226	2.6e+00	6.3e-01	1.8e+00	5.2e+00	8.0e+00	5.1e-01	1.3e-01	3.5e-01	1.0e+00	1.6e+00
Ra-228	1.4e+00	3.4e-01	9.3e-01	2.8e+00	4.3e+00	2.7e-01	7.1e-02	1.8e-01	5.5e-01	8.1e-01
Ac-227	4.4e+00	5.9e-01	2.5e+00	1.0e+01	1.5e+01	8.6e-01	1.2e-01	5.0e-01	2.0e+00	3.0e+00
Th-228	3.1e+00	7.2e-01	1.9e+00	7.0e+00	9.4e+00	6.1e-01	1.5e-01	3.9e-01	1.3e+00	1.9e+00
Th-229	5.6e+00	6.9e-01	3.1e+00	1.4e+01	1.9e+01	1.1e+00	1.4e-01	6.1e-01	2.5e+00	4.0e+00
Th-230	7.9e-01	8.5e-02	4.3e-01	1.9e+00	2.7e+00	1.6e-01	1.7e-02	8.5e-02	3.5e-01	5.8e-01
Th-232	3.5e+00	3.8e-01	1.9e+00	8.4e+00	1.2e+01	6.9e-01	7.6e-02	3.7e-01	1.6e+00	2.6e+00
Pa-231	2.6e+00	3.2e-01	1.4e+00	6.6e+00	9.2e+00	5.2e-01	6.2e-02	2.8e-01	1.3e+00	1.9e+00
U-232	2.1e+00	2.7e-01	1.1e+00	4.9e+00	7.2e+00	4.1e-01	5.3e-02	2.2e-01	9.4e-01	1.5e+00
U-233	4.0e-01	4.8e-02	2.2e-01	9.6e-01	1.4e+00	8.0e-02	9.3e-03	4.2e-02	1.9e-01	3.0e-01
U-234	4.0e-01	4.7e-02	2.1e-01	9.4e-01	1.4e+00	7.8e-02	9.1e-03	4.1e-02	1.8e-01	2.9e-01
U-235	4.9e-01	8.9e-02	2.9e-01	1.1e+00	1.7e+00	9.7e-02	1.8e-02	5.9e-02	2.1e-01	3.3e-01
U-236	3.7e-01	4.4e-02	2.0e-01	8.9e-01	1.3e+00	7.4e-02	8.6e-03	3.9e-02	1.7e-01	2.8e-01
U-238	3.9e-01	5.5e-02	2.1e-01	9.1e-01	1.4e+00	7.7e-02	1.1e-02	4.3e-02	1.7e-01	2.7e-01
Np-237	1.8e+00	2.6e-01	1.1e+00	4.1e+00	6.1e+00	3.5e-01	5.2e-02	2.1e-01	7.9e-01	1.2e+00
Pu-236	3.7e-01	4.3e-02	2.2e-01	8.8e-01	1.3e+00	7.4e-02	8.7e-03	4.3e-02	1.7e-01	2.5e-01
Pu-238	8.5e-01	9.7e-02	4.9e-01	2.0e+00	2.9e+00	1.7e-01	2.0e-02	9.6e-02	3.9e-01	5.8e-01
Pu-239	9.1e-01	1.0e-01	5.3e-01	2.1e+00	3.1e+00	1.8e-01	2.1e-02	1.0e-01	4.2e-01	6.2e-01
Pu-240	9.1e-01	1.0e-01	5.3e-01	2.1e+00	3.1e+00	1.8e-01	2.1e-02	1.0e-01	4.2e-01	6.2e-01
Pu-241	1.5e-02	1.7e-03	8.6e-03	3.5e-02	5.0e-02	2.9e-03	3.5e-04	1.7e-03	6.8e-03	1.0e-02
Pu-242	8.7e-01	9.8e-02	5.0e-01	2.0e+00	2.9e+00	1.7e-01	2.0e-02	9.8e-02	4.0e-01	5.9e-01
Pu-244	1.3e+00	2.5e-01	6.4e-01	2.9e+00	4.2e+00	2.6e-01	5.2e-02	1.7e-01	5.8e-01	8.2e-01
Am-241	1.3e+00	1.5e-01	7.1e-01	3.1e+00	5.0e+00	2.6e-01	3.0e-02	1.4e-01	6.0e-01	9.6e-01
Am-242m	1.3e+00	1.5e-01	7.1e-01	3.1e+00	4.9e+00	2.6e-01	3.1e-02	1.4e-01	6.0e-01	9.5e-01
Am-243	1.5e+00	2.0e-01	8.1e-01	3.3e+00	5.3e+00	2.9e-01	4.1e-02	1.6e-01	6.4e-01	1.0e+00
Cm-242	4.5e-02	5.3e-03	2.5e-02	1.1e-01	1.6e-01	8.8e-03	1.1e-03	4.8e-03	2.2e-02	3.1e-02
Cm-243	1.0e+00	1.4e-01	5.9e-01	2.4e+00	3.5e+00	2.0e-01	2.9e-02	1.2e-01	4.8e-01	7.0e-01
Cm-244	7.4e-01	8.7e-02	4.1e-01	1.8e+00	2.6e+00	1.5e-01	1.8e-02	7.9e-02	3.7e-01	5.1e-01
Cm-245	1.4e+00	1.8e-01	8.0e-01	3.4e+00	5.0e+00	2.8e-01	3.5e-02	1.5e-01	6.9e-01	9.6e-01
Cm-246	1.3e+00	1.6e-01	7.5e-01	3.3e+00	4.8e+00	2.7e-01	3.3e-02	1.4e-01	6.7e-01	9.4e-01
Cm-247	1.6e+00	2.9e-01	9.9e-01	3.9e+00	5.7e+00	3.2e-01	5.9e-02	2.0e-01	7.8e-01	1.1e+00
Cm-248	4.9e+00	5.8e-01	2.7e+00	1.2e+01	1.8e+01	9.7e-01	1.2e-01	5.3e-01	2.5e+00	3.4e+00
Bk-249	4.2e-03	5.1e-04	2.3e-03	1.0e-02	1.5e-02	8.4e-04	1.0e-04	4.5e-04	2.1e-03	3.0e-03
Cf-248	1.4e-01	1.5e-02	7.5e-02	3.4e-01	5.1e-01	2.8e-02	3.2e-03	1.5e-02	6.6e-02	1.0e-01
Cf-249	1.6e+00	2.7e-01	9.2e-01	3.6e+00	5.2e+00	3.1e-01	5.5e-02	1.8e-01	7.4e-01	1.0e+00
Cf-250	6.2e-01	6.4e-02	3.2e-01	1.5e+00	2.3e+00	1.2e-01	1.4e-02	6.4e-02	2.8e-01	4.4e-01
Cf-251	1.2e+00	1.5e-01	6.7e-01	3.0e+00	4.5e+00	2.4e-01	3.2e-02	1.3e-01	5.5e-01	8.5e-01
Cf-252	4.6e-01	4.8e-02	2.4e-01	1.1e+00	1.7e+00	9.0e-02	1.0e-02	4.7e-02	2.1e-01	3.2e-01
Cf-254	1.8e+01	4.5e+00	1.2e+01	3.7e+01	5.3e+01	3.6e+00	9.6e-01	2.4e+00	7.3e+00	1.0e+01
Es-254	1.3e+00	3.3e-01	9.0e-01	2.8e+00	4.2e+00	2.7e-01	6.7e-02	1.8e-01	5.2e-01	8.3e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.45 Normalized effective dose equivalents from external exposure: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.2e+01	9.4e+00	2.2e+01	6.3e+01	9.9e+01	6.3e+00	1.9e+00	4.3e+00	1.2e+01	1.9e+01
P-32	5.8e-04	7.1e-05	3.3e-04	1.4e-03	1.8e-03	1.1e-04	1.5e-05	6.6e-05	2.7e-04	3.7e-04
S-35	5.2e-07	1.2e-07	3.5e-07	1.0e-06	1.6e-06	1.0e-07	2.3e-08	6.9e-08	2.0e-07	3.0e-07
Cl-36	3.7e-03	8.2e-04	2.4e-03	7.6e-03	1.0e-02	7.3e-04	1.3e-04	4.7e-04	1.5e-03	2.1e-03
K-40	2.5e+00	7.3e-01	1.7e+00	4.9e+00	8.0e+00	4.9e-01	1.5e-01	3.3e-01	9.6e-01	1.5e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	8.6e-06	1.7e-06	4.4e-06	1.4e-05	1.9e-05	1.3e-06	3.4e-07	8.5e-07	2.7e-06	3.7e-06
Sc-46	2.3e+00	5.9e-01	1.5e+00	4.5e+00	7.0e+00	4.5e-01	1.2e-01	3.0e-01	9.1e-01	1.4e+00
Cr-51	8.2e-03	1.4e-03	5.3e-03	1.6e-02	2.4e-02	1.6e-03	2.9e-04	1.1e-03	3.2e-03	4.8e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.5e-01	2.4e-01	5.6e-01	1.7e+00	2.5e+00	1.7e-01	5.0e-02	1.1e-01	3.3e-01	5.2e-01
Fe-55	2.0e-11	4.7e-12	1.3e-11	3.9e-11	5.9e-11	3.9e-12	9.5e-13	2.6e-12	7.7e-12	1.2e-11
Fe-59	2.8e-01	6.3e-02	1.8e-01	5.7e-01	8.7e-01	5.4e-02	1.2e-02	3.6e-02	1.1e-01	1.8e-01
Co-58	1.0e+00	2.4e-01	6.9e-01	2.1e+00	2.9e+00	2.1e-01	4.7e-02	1.4e-01	4.3e-01	5.7e-01
Co-57	1.4e-02	3.2e-03	8.8e-03	2.8e-02	3.8e-02	2.7e-03	6.3e-04	1.8e-03	5.5e-03	7.4e-03
Co-58	2.7e-01	6.1e-02	1.8e-01	5.5e-01	7.6e-01	5.2e-02	1.2e-02	3.5e-02	1.1e-01	1.5e-01
Co-60	9.9e-01	2.3e-01	6.5e-01	2.1e+00	2.7e+00	2.0e-01	4.6e-02	1.3e-01	4.0e-01	5.6e-01
Ni-59	5.8e-06	1.3e-06	3.8e-06	1.1e-05	1.7e-05	1.1e-06	2.6e-07	7.7e-07	2.2e-06	3.3e-06
Ni-63	1.0e-09	2.2e-10	6.6e-10	1.9e-09	3.0e-09	2.0e-10	4.5e-11	1.3e-10	3.8e-10	5.8e-10
Zn-65	1.5e+01	4.5e+00	1.0e+01	3.0e+01	4.7e+01	3.0e+00	9.0e-01	2.0e+00	5.9e+00	8.8e+00
As-73	1.5e-03	3.2e-04	9.7e-04	3.1e-03	4.4e-03	2.9e-04	6.4e-05	1.9e-04	6.1e-04	8.7e-04
Se-75	5.9e+00	1.7e+00	4.0e+00	1.1e+01	1.8e+01	1.2e+00	3.5e-01	7.9e-01	2.2e+00	3.4e+00
Sr-85	4.7e-01	1.1e-01	3.1e-01	9.6e-01	1.4e+00	9.2e-02	2.4e-02	6.3e-02	1.9e-01	2.7e-01
Sr-89	1.8e-03	4.3e-04	1.2e-03	3.8e-03	5.4e-03	3.6e-04	9.0e-05	2.5e-04	7.4e-04	1.0e-03
Sr-90	8.6e-03	2.3e-03	5.8e-03	1.7e-02	2.5e-02	1.7e-03	4.5e-04	1.1e-03	3.3e-03	5.3e-03
Y-91	5.7e-03	1.4e-03	3.8e-03	1.2e-02	1.7e-02	1.1e-03	2.8e-04	7.3e-04	2.2e-03	3.2e-03
Zr-93	4.7e-09	1.2e-09	3.0e-09	8.9e-09	1.4e-08	9.2e-10	2.4e-10	6.1e-10	1.8e-09	2.5e-09
Zr-95	1.2e+00	3.2e-01	7.9e-01	2.2e+00	3.5e+00	2.4e-01	6.1e-02	1.5e-01	4.5e-01	6.4e-01
Nb-93m	7.0e-10	1.8e-10	4.7e-10	1.3e-09	2.1e-09	1.4e-10	3.7e-11	9.2e-11	2.7e-10	4.1e-10
Nb-94	2.3e+00	5.9e-01	1.5e+00	4.4e+00	6.7e+00	4.5e-01	1.2e-01	3.0e-01	8.8e-01	1.4e+00
Nb-95	5.8e-01	1.2e-01	3.9e-01	1.2e+00	1.7e+00	1.1e-01	2.4e-02	7.6e-02	2.3e-01	3.4e-01
Mo-93	3.1e-10	7.5e-11	2.1e-10	6.2e-10	8.4e-10	6.2e-11	1.5e-11	4.1e-11	1.2e-10	1.8e-10
Tc-97	1.5e-09	3.5e-10	9.7e-10	2.9e-09	4.6e-09	2.9e-10	7.0e-11	1.9e-10	5.8e-10	9.3e-10
Tc-97m	1.7e-05	4.0e-06	1.1e-05	3.6e-05	5.3e-05	3.4e-06	8.0e-07	2.3e-06	7.2e-06	1.1e-05
Tc-99	4.7e-06	1.1e-06	3.1e-06	9.3e-06	1.5e-05	9.3e-07	2.3e-07	6.1e-07	1.9e-06	3.0e-06
Ru-103	1.0e-01	2.2e-02	6.4e-02	2.0e-01	3.2e-01	2.0e-02	4.5e-03	1.3e-02	3.9e-02	6.0e-02
Ru-106	7.9e-02	1.8e-02	5.2e-02	1.6e-01	2.2e-01	1.6e-02	3.7e-03	1.0e-02	3.0e-02	4.3e-02
Ag-108m	7.1e+00	1.4e+00	4.5e+00	1.4e+01	2.2e+01	1.4e+00	2.8e-01	9.1e-01	2.8e+00	4.5e+00
Ag-110m	1.1e+01	2.2e+00	7.4e+00	2.3e+01	3.6e+01	2.3e+00	4.5e-01	1.5e+00	4.4e+00	7.2e+00
Cd-109	1.4e-02	4.2e-03	9.5e-03	2.7e-02	4.3e-02	2.7e-03	8.4e-04	1.8e-03	5.3e-03	8.2e-03
Sn-113	7.0e-02	1.6e-02	4.6e-02	1.4e-01	2.1e-01	1.4e-02	3.1e-03	9.2e-03	2.8e-02	4.0e-02
Sb-124	4.7e+00	9.1e-01	2.9e+00	9.8e+00	1.5e+01	9.3e-01	1.8e-01	5.8e-01	2.0e+00	2.9e+00
Sb-125	1.4e+00	2.6e-01	8.8e-01	2.8e+00	4.2e+00	2.8e-01	5.5e-02	1.8e-01	5.5e-01	8.7e-01
Te-123m	1.4e+00	4.2e-01	9.8e-01	2.8e+00	4.5e+00	2.9e-01	8.6e-02	1.9e-01	5.5e-01	8.3e-01
Te-127m	1.0e-01	2.9e-02	7.0e-02	2.0e-01	3.2e-01	2.0e-02	6.0e-03	1.4e-02	3.9e-02	5.9e-02
I-125	1.7e-04	2.6e-05	1.1e-04	3.7e-04	5.4e-04	3.4e-05	5.1e-06	2.1e-05	7.3e-05	1.1e-04
I-129	4.0e-04	5.7e-05	2.4e-04	8.8e-04	1.2e-03	7.8e-05	1.1e-05	4.6e-05	1.7e-04	2.4e-04
I-131	2.3e-01	6.0e-03	7.0e-02	5.4e-01	8.9e-01	4.4e-02	1.3e-03	1.4e-02	1.1e-01	1.7e-01
Cs-134	4.4e+01	1.3e+01	3.0e+01	8.5e+01	1.3e+02	8.6e+00	2.6e+00	5.8e+00	1.6e+01	2.6e+01
Cs-135	3.9e-04	1.2e-04	2.6e-04	7.5e-04	1.2e-03	7.6e-05	2.3e-05	5.2e-05	1.5e-04	2.3e-04
Cs-137	1.6e+01	4.9e+00	1.1e+01	3.1e+01	5.0e+01	3.2e+00	9.6e-01	2.2e+00	6.1e+00	9.6e+00
Ba-133	4.2e-01	1.1e-01	2.7e-01	7.8e-01	1.2e+00	8.2e-02	2.2e-02	5.3e-02	1.6e-01	2.4e-01
Ce-139	8.0e-02	2.0e-02	5.2e-02	1.6e-01	2.4e-01	1.6e-02	4.0e-03	1.0e-02	3.1e-02	4.8e-02
Ce-141	2.1e-02	4.4e-03	1.4e-02	4.6e-02	6.8e-02	4.1e-03	8.9e-04	2.7e-03	8.6e-03	1.3e-02
Ce-144	6.1e-02	1.5e-02	3.9e-02	1.2e-01	1.9e-01	1.2e-02	3.2e-03	8.0e-03	2.4e-02	3.6e-02
Pm-147	5.1e-06	1.3e-06	3.4e-06	1.0e-05	1.6e-05	1.0e-06	2.5e-07	6.8e-07	2.0e-06	3.1e-06

Table F1.45 Normalized effective dose equivalents from external exposure: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-08	2.6e-09	6.6e-09	2.0e-08	2.7e-08	2.0e-09	5.2e-10	1.3e-09	4.0e-09	5.5e-09
Eu-152	1.6e+00	4.4e-01	1.1e+00	3.2e+00	4.9e+00	3.2e-01	8.5e-02	2.1e-01	6.2e-01	9.6e-01
Eu-154	1.6e+00	4.3e-01	1.1e+00	3.2e+00	4.8e+00	3.1e-01	8.3e-02	2.1e-01	6.1e-01	9.4e-01
Eu-155	1.3e-02	3.6e-03	9.0e-03	2.7e-02	4.0e-02	2.6e-03	7.0e-04	1.8e-03	5.1e-03	7.9e-03
Gd-153	1.5e-02	4.0e-03	1.0e-02	3.1e-02	4.4e-02	3.0e-03	8.1e-04	2.1e-03	6.0e-03	8.7e-03
Tb-160	1.2e+00	3.1e-01	7.5e-01	2.4e+00	3.8e+00	2.3e-01	6.0e-02	1.5e-01	4.6e-01	7.8e-01
Tm-170	9.3e-04	2.4e-04	6.1e-04	1.9e-03	2.9e-03	1.8e-04	5.1e-05	1.2e-04	3.8e-04	5.5e-04
Tm-171	3.3e-05	8.6e-06	2.2e-05	6.8e-05	1.0e-04	6.6e-06	1.8e-06	4.4e-06	1.3e-05	2.0e-05
Ta-182	1.5e+00	3.7e-01	9.8e-01	3.1e+00	4.6e+00	2.9e-01	7.8e-02	2.0e-01	5.8e-01	8.9e-01
W-181	5.9e-04	1.4e-04	3.9e-04	1.2e-03	1.8e-03	1.2e-04	2.7e-05	7.8e-05	2.4e-04	3.7e-04
W-185	1.2e-05	2.6e-06	7.6e-06	2.4e-05	3.6e-05	2.3e-06	5.3e-07	1.5e-06	4.7e-06	7.3e-06
Os-185	1.4e+01	4.1e+00	9.6e+00	2.8e+01	4.4e+01	2.8e+00	8.3e-01	1.9e+00	5.5e+00	8.2e+00
Ir-192	1.9e-01	4.5e-02	1.3e-01	4.0e-01	5.7e-01	3.8e-02	8.9e-03	2.5e-02	8.1e-02	1.1e-01
Tl-204	9.3e-03	2.8e-03	6.4e-03	1.8e-02	2.9e-02	1.8e-03	5.5e-04	1.2e-03	3.5e-03	5.6e-03
Pb-210	2.2e-02	6.7e-03	1.5e-02	4.3e-02	6.9e-02	4.4e-03	1.3e-03	2.9e-03	8.5e-03	1.3e-02
Bi-207	4.3e+01	1.3e+01	2.9e+01	8.3e+01	1.3e+02	8.5e+00	2.6e+00	5.8e+00	1.6e+01	2.5e+01
Po-210	2.4e-04	6.9e-05	1.6e-04	4.6e-04	7.3e-04	4.7e-05	1.4e-05	3.2e-05	9.1e-05	1.3e-04
Ra-226	2.6e+00	6.2e-01	1.7e+00	5.1e+00	8.0e+00	5.0e-01	1.3e-01	3.4e-01	1.0e+00	1.6e+00
Ra-228	1.3e+00	3.2e-01	8.9e-01	2.6e+00	4.2e+00	2.6e-01	6.6e-02	1.8e-01	5.3e-01	8.0e-01
Ac-227	4.4e-01	1.1e-01	2.9e-01	8.7e-01	1.4e+00	8.6e-02	2.3e-02	5.7e-02	1.7e-01	2.6e-01
Th-228	2.1e+00	5.4e-01	1.3e+00	4.3e+00	6.3e+00	4.1e-01	1.1e-01	2.7e-01	8.5e-01	1.2e+00
Th-229	3.1e-01	8.0e-02	2.0e-01	6.3e-01	9.6e-01	6.1e-02	1.6e-02	4.0e-02	1.3e-01	1.8e-01
Th-230	2.3e-04	5.4e-05	1.5e-04	4.5e-04	7.3e-04	4.5e-05	1.1e-05	2.9e-05	8.7e-05	1.5e-04
Th-232	1.6e-02	2.3e-03	9.4e-03	3.1e-02	5.2e-02	3.1e-03	4.7e-04	1.9e-03	6.3e-03	1.0e-02
Pa-231	3.7e-02	9.8e-03	2.4e-02	7.1e-02	1.1e-01	7.4e-03	2.0e-03	4.7e-03	1.4e-02	2.1e-02
U-232	7.4e-02	1.2e-02	4.4e-02	1.5e-01	2.3e-01	1.5e-02	2.3e-03	8.9e-03	3.1e-02	4.6e-02
U-233	1.6e-04	4.2e-05	9.9e-05	3.2e-04	4.8e-04	3.1e-05	8.5e-06	2.0e-05	6.5e-05	9.5e-05
U-234	2.8e-05	7.5e-06	1.8e-05	5.7e-05	8.4e-05	5.5e-06	1.5e-06	3.5e-06	1.1e-05	1.7e-05
U-235	1.3e-01	3.4e-02	7.9e-02	2.6e-01	3.8e-01	2.5e-02	6.8e-03	1.6e-02	5.1e-02	7.6e-02
U-236	1.1e-05	3.0e-06	6.9e-06	2.2e-05	3.3e-05	2.2e-06	5.9e-07	1.4e-06	4.5e-06	6.6e-06
U-238	3.5e-02	9.6e-03	2.2e-02	7.2e-02	1.1e-01	7.0e-03	1.9e-03	4.5e-03	1.5e-02	2.1e-02
Np-237	2.5e-01	5.8e-02	1.5e-01	4.5e-01	7.0e-01	4.4e-02	1.1e-02	3.0e-02	8.7e-02	1.4e-01
Pu-236	5.3e-05	6.5e-06	3.0e-05	1.1e-04	1.6e-04	1.0e-05	1.3e-06	5.9e-06	2.2e-05	3.1e-05
Pu-238	4.0e-06	1.0e-06	2.7e-06	7.6e-06	1.2e-05	7.9e-07	2.0e-07	5.3e-07	1.5e-06	2.3e-06
Pu-239	4.4e-05	1.1e-05	3.0e-05	8.3e-05	1.3e-04	8.7e-06	2.2e-06	5.8e-06	1.6e-05	2.6e-05
Pu-240	3.7e-06	9.4e-07	2.5e-06	7.0e-06	1.1e-05	7.3e-07	1.8e-07	4.8e-07	1.4e-06	2.2e-06
Pu-241	8.0e-07	1.9e-07	5.2e-07	1.5e-06	2.4e-06	1.6e-07	3.9e-08	1.1e-07	2.9e-07	4.9e-07
Pu-242	3.6e-06	9.2e-07	2.4e-06	6.8e-06	1.1e-05	7.1e-07	1.8e-07	4.7e-07	1.3e-06	2.1e-06
Pu-244	4.7e-01	1.2e-01	3.2e-01	8.8e-01	1.4e+00	9.2e-02	2.3e-02	6.1e-02	1.7e-01	2.7e-01
Am-241	1.6e-03	4.3e-04	1.0e-03	3.1e-03	5.0e-03	3.2e-04	8.7e-05	2.1e-04	6.0e-04	9.8e-04
Am-242m	9.2e-03	2.5e-03	5.8e-03	1.8e-02	2.9e-02	1.8e-03	5.0e-04	1.2e-03	3.5e-03	5.6e-03
Am-243	1.3e-01	3.6e-02	8.5e-02	2.6e-01	4.1e-01	2.6e-02	7.2e-03	1.7e-02	5.0e-02	8.2e-02
Cm-242	4.2e-06	1.1e-06	2.8e-06	7.9e-06	1.4e-05	8.3e-07	2.1e-07	5.4e-07	1.6e-06	2.7e-06
Cm-243	9.5e-02	2.5e-02	6.1e-02	1.8e-01	3.0e-01	1.9e-02	4.9e-03	1.2e-02	3.6e-02	6.0e-02
Cm-244	4.1e-06	1.1e-06	2.7e-06	8.0e-06	1.3e-05	8.2e-07	2.1e-07	5.2e-07	1.6e-06	2.6e-06
Cm-245	4.1e-02	1.1e-02	2.7e-02	7.9e-02	1.3e-01	8.1e-03	2.1e-03	5.2e-03	1.5e-02	2.6e-02
Cm-246	2.5e-07	6.6e-08	1.6e-07	4.7e-07	7.8e-07	4.8e-08	1.3e-08	3.1e-08	9.3e-08	1.6e-07
Cm-247	4.1e-01	1.1e-01	2.7e-01	8.0e-01	1.3e+00	8.1e-02	2.1e-02	5.2e-02	1.6e-01	2.6e-01
Cm-248	2.1e-07	5.7e-08	1.4e-07	4.1e-07	6.8e-07	4.2e-08	1.1e-08	2.7e-08	8.0e-08	1.3e-07
Bk-249	7.8e-05	1.3e-05	4.6e-05	1.6e-04	2.4e-04	1.5e-05	2.5e-06	9.2e-06	3.2e-05	5.0e-05
Cf-248	5.5e-06	1.4e-06	3.6e-06	1.1e-05	1.6e-05	1.1e-06	2.9e-07	7.0e-07	2.2e-06	3.1e-06
Cf-249	4.0e-01	1.0e-01	2.7e-01	8.1e-01	1.1e+00	8.0e-02	2.2e-02	5.1e-02	1.6e-01	2.3e-01
Cf-250	1.3e-07	3.3e-08	8.5e-08	2.6e-07	3.6e-07	2.5e-08	6.8e-09	1.6e-08	5.3e-08	7.4e-08
Cf-251	7.0e-02	1.8e-02	4.7e-02	1.4e-01	2.0e-01	1.4e-02	3.7e-03	8.9e-03	2.9e-02	4.0e-02
Cf-252	6.1e-06	1.6e-06	4.0e-06	1.2e-05	1.7e-05	1.2e-06	3.2e-07	7.8e-07	2.5e-06	3.5e-06
Cf-254	1.8e+01	4.5e+00	1.2e+01	3.6e+01	5.1e+01	3.5e+00	9.3e-01	2.3e+00	7.1e+00	9.9e+00
Es-254	1.2e+00	3.0e-01	8.3e-01	2.5e+00	3.9e+00	2.4e-01	6.1e-02	1.7e-01	4.9e-01	7.8e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.48 Normalized effective dose equivalents from inhalation: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.2e-04	2.8e-05	1.2e-04	5.2e-04	8.0e-04	4.4e-05	5.4e-06	2.5e-05	1.1e-04	1.5e-04
P-32	2.6e-06	1.8e-07	1.1e-06	6.4e-06	9.6e-06	5.0e-07	3.6e-08	2.3e-07	1.3e-06	1.8e-06
S-35	3.4e-06	3.7e-07	1.8e-06	7.8e-06	1.1e-05	6.6e-07	7.1e-08	3.5e-07	1.5e-06	2.2e-06
Cl-38	2.9e-04	2.6e-05	1.5e-04	6.5e-04	9.8e-04	5.8e-05	4.9e-06	3.0e-05	1.3e-04	1.9e-04
K-40	3.7e-04	4.5e-05	2.0e-04	8.5e-04	1.3e-03	7.3e-05	8.9e-06	4.0e-05	1.7e-04	2.5e-04
Ca-41	4.0e-06	4.5e-07	2.2e-06	9.4e-06	1.4e-05	7.9e-07	8.6e-08	4.2e-07	2.0e-06	2.8e-06
Ca-45	1.7e-05	1.8e-06	9.1e-06	4.0e-05	5.8e-05	3.3e-06	3.8e-07	1.8e-06	8.4e-06	1.2e-05
Sc-46	6.5e-05	7.3e-06	3.6e-05	1.6e-04	2.2e-04	1.3e-05	1.5e-06	7.2e-06	3.1e-05	4.6e-05
Cr-51	2.1e-07	2.0e-08	1.0e-07	5.1e-07	7.3e-07	4.1e-08	3.9e-09	2.1e-08	9.8e-08	1.4e-07
Mn-53	1.1e-06	1.3e-07	6.0e-07	2.6e-06	3.8e-06	2.1e-07	2.6e-08	1.2e-07	5.1e-07	7.4e-07
Mn-54	1.3e-05	1.6e-06	7.3e-06	3.2e-05	4.7e-05	2.6e-06	3.3e-07	1.4e-06	6.5e-06	9.3e-06
Fe-55	9.9e-07	1.2e-07	5.3e-07	2.3e-06	3.2e-06	2.0e-07	2.4e-08	1.1e-07	4.4e-07	6.7e-07
Fe-59	5.4e-06	6.5e-07	3.0e-06	1.3e-05	1.9e-05	1.1e-06	1.3e-07	5.9e-07	2.6e-06	3.7e-06
Co-56	2.3e-05	2.4e-06	1.2e-05	5.8e-05	8.0e-05	4.5e-06	5.0e-07	2.4e-06	1.1e-05	1.6e-05
Co-57	6.5e-06	6.8e-07	3.4e-06	1.6e-05	2.3e-05	1.3e-06	1.4e-07	6.5e-07	3.1e-06	4.8e-06
Co-58	6.1e-06	6.3e-07	3.2e-06	1.6e-05	2.1e-05	1.2e-06	1.3e-07	6.4e-07	2.9e-06	4.2e-06
Co-60	1.7e-04	1.8e-05	8.8e-05	4.2e-04	6.1e-04	3.4e-05	3.8e-06	1.7e-05	8.0e-05	1.3e-04
Ni-59	7.0e-07	7.8e-08	3.8e-07	1.6e-06	2.6e-06	1.4e-07	1.6e-08	7.7e-08	3.2e-07	5.1e-07
Ni-63	1.8e-06	2.0e-07	9.6e-07	4.1e-06	6.5e-06	3.5e-07	4.0e-08	1.9e-07	8.1e-07	1.3e-06
Zn-65	1.0e-03	1.2e-04	5.6e-04	2.4e-03	3.6e-03	2.0e-04	2.5e-05	1.1e-04	4.8e-04	7.2e-04
As-73	5.4e-05	5.5e-06	3.0e-05	1.3e-04	2.0e-04	1.1e-05	1.1e-06	5.9e-06	2.5e-05	4.1e-05
Se-75	4.0e-04	4.9e-05	2.2e-04	9.6e-04	1.4e-03	7.8e-05	9.8e-06	4.3e-05	1.8e-04	2.7e-04
Sr-85	3.9e-06	4.6e-07	2.1e-06	9.2e-06	1.3e-05	7.6e-07	9.0e-08	4.1e-07	1.8e-06	2.6e-06
Sr-89	1.2e-05	1.4e-06	6.3e-06	2.8e-05	4.0e-05	2.3e-06	2.8e-07	1.3e-06	5.7e-06	7.9e-06
Sr-90	7.2e-04	8.8e-05	3.9e-04	1.7e-03	2.5e-03	1.4e-04	1.7e-05	7.7e-05	3.5e-04	4.8e-04
Y-91	9.3e-05	1.1e-05	4.9e-05	2.4e-04	3.1e-04	1.8e-05	2.4e-06	9.7e-06	4.7e-05	6.0e-05
Zr-93	2.5e-04	2.9e-05	1.3e-04	5.5e-04	8.8e-04	4.9e-05	6.1e-06	2.6e-05	1.1e-04	1.8e-04
Zr-95	3.9e-05	4.5e-06	2.1e-05	9.2e-05	1.4e-04	7.7e-06	9.7e-07	4.1e-06	1.8e-05	2.7e-05
Nb-93m	8.5e-05	9.8e-06	4.5e-05	2.0e-04	2.8e-04	1.7e-05	1.9e-06	9.1e-06	3.9e-05	5.4e-05
Nb-94	1.2e-03	1.4e-04	6.4e-04	2.8e-03	4.0e-03	2.4e-04	2.7e-05	1.3e-04	5.5e-04	7.7e-04
Nb-95	8.7e-06	8.9e-07	4.7e-06	2.2e-05	2.9e-05	1.7e-06	1.8e-07	9.2e-07	4.1e-06	5.6e-06
Mo-93	2.3e-05	2.6e-06	1.2e-05	5.3e-05	8.1e-05	4.5e-06	5.1e-07	2.4e-06	1.1e-05	1.6e-05
Tc-97	7.7e-07	8.4e-08	4.1e-07	1.8e-06	2.5e-06	1.5e-07	1.6e-08	8.1e-08	3.6e-07	5.0e-07
Tc-97m	2.9e-06	3.0e-07	1.6e-06	7.0e-06	9.9e-06	5.6e-07	6.0e-08	3.1e-07	1.3e-06	1.8e-06
Tc-99	8.4e-06	7.1e-07	3.4e-06	1.5e-05	2.1e-05	1.3e-06	1.4e-07	6.8e-07	3.0e-06	4.2e-06
Ru-103	3.9e-06	4.1e-07	2.0e-06	9.2e-06	1.4e-05	7.6e-07	7.9e-08	4.0e-07	1.9e-06	2.7e-06
Ru-106	3.5e-04	3.8e-05	1.8e-04	8.8e-04	1.2e-03	7.0e-05	7.8e-06	3.6e-05	1.7e-04	2.4e-04
Ag-108m	2.7e-04	2.4e-05	1.4e-04	6.0e-04	9.7e-04	5.3e-05	4.8e-06	2.8e-05	1.2e-04	1.9e-04
Ag-110m	3.2e-04	2.8e-05	1.7e-04	7.3e-04	1.1e-03	6.4e-05	5.5e-06	3.3e-05	1.4e-04	2.3e-04
Cd-109	2.6e-03	3.1e-04	1.4e-03	6.1e-03	8.9e-03	5.0e-04	6.4e-05	2.8e-04	1.2e-03	1.8e-03
Sn-113	6.7e-06	6.9e-07	3.4e-06	1.7e-05	2.3e-05	1.3e-06	1.4e-07	6.9e-07	3.2e-06	4.6e-06
Sb-124	1.2e-04	1.1e-05	6.6e-05	2.9e-04	4.2e-04	2.4e-05	2.1e-06	1.3e-05	5.7e-05	8.2e-05
Sb-125	1.0e-04	8.9e-06	5.4e-05	2.3e-04	3.4e-04	2.0e-05	1.7e-06	1.0e-05	4.5e-05	7.1e-05
Te-123m	5.0e-04	6.1e-05	2.7e-04	1.2e-03	1.7e-03	9.8e-05	1.2e-05	5.4e-05	2.3e-04	3.3e-04
Te-127m	1.0e-03	1.2e-04	5.5e-04	2.4e-03	3.4e-03	2.0e-04	2.5e-05	1.1e-04	4.6e-04	6.8e-04
I-125	2.2e-04	1.5e-05	1.1e-04	5.5e-04	8.7e-04	4.4e-05	3.3e-06	2.2e-05	1.1e-04	1.7e-04
I-129	2.4e-03	1.7e-04	1.2e-03	5.9e-03	9.2e-03	4.8e-04	3.3e-05	2.3e-04	1.2e-03	1.9e-03
I-131	4.3e-05	7.5e-07	1.1e-05	9.6e-05	1.8e-04	8.4e-06	1.5e-07	2.1e-06	1.9e-05	3.3e-05
Cs-134	2.6e-03	3.2e-04	1.4e-03	6.3e-03	9.1e-03	5.2e-04	6.4e-05	2.9e-04	1.2e-03	1.8e-03
Cs-135	2.7e-04	3.3e-05	1.5e-04	6.3e-04	9.2e-04	5.2e-05	6.5e-06	2.9e-05	1.3e-04	1.8e-04
Cs-137	1.9e-03	2.3e-04	1.0e-03	4.4e-03	6.5e-03	3.7e-04	4.6e-05	2.0e-04	8.9e-04	1.3e-03
Ba-133	2.3e-05	2.6e-06	1.2e-05	5.5e-05	7.3e-05	4.4e-06	5.3e-07	2.5e-06	1.1e-05	1.4e-05
Ce-139	2.2e-05	2.5e-06	1.2e-05	5.2e-05	8.2e-05	4.4e-06	5.2e-07	2.4e-06	1.0e-05	1.6e-05
Ce-141	1.3e-05	1.3e-06	6.3e-06	3.0e-05	4.6e-05	2.5e-06	2.7e-07	1.3e-06	5.9e-06	8.6e-06
Ce-144	1.0e-03	1.2e-04	5.3e-04	2.3e-03	3.7e-03	2.0e-04	2.4e-05	1.1e-04	4.6e-04	7.2e-04
Pm-147	1.1e-04	1.3e-05	6.1e-05	2.5e-04	3.8e-04	2.2e-05	2.6e-06	1.2e-05	4.9e-05	7.4e-05

Table F1.46 Normalized effective dose equivalents from inhalation: EAF dust–dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	6.8e-05	9.6e-06	4.8e-05	2.0e-04	3.0e-04	1.7e-05	1.9e-06	9.3e-06	4.1e-05	5.9e-05
Eu-152	6.3e-04	7.6e-05	3.8e-04	1.6e-03	2.1e-03	1.2e-04	1.5e-05	7.0e-05	3.1e-04	4.2e-04
Eu-154	8.2e-04	9.8e-05	4.6e-04	2.0e-03	2.7e-03	1.6e-04	2.0e-05	9.1e-05	4.0e-04	5.4e-04
Eu-155	1.2e-04	1.4e-05	6.6e-05	2.9e-04	3.9e-04	2.3e-05	2.8e-06	1.3e-05	5.7e-05	7.7e-05
Gd-153	2.5e-05	2.8e-06	1.4e-05	6.3e-05	9.1e-05	5.0e-06	5.6e-07	2.7e-06	1.2e-05	1.8e-05
Tb-160	5.2e-05	6.0e-06	2.8e-05	1.3e-04	1.7e-04	1.0e-05	1.2e-06	5.5e-06	2.5e-05	3.4e-05
Tm-170	6.2e-05	7.0e-06	3.5e-05	1.5e-04	2.1e-04	1.2e-05	1.4e-06	6.8e-06	3.0e-05	4.2e-05
Tm-171	2.5e-05	2.8e-06	1.4e-05	6.2e-05	8.9e-05	5.0e-06	5.5e-07	2.8e-06	1.2e-05	1.8e-05
Ta-182	1.1e-04	1.2e-05	5.8e-05	2.4e-04	3.8e-04	2.1e-05	2.6e-06	1.1e-05	4.7e-05	7.4e-05
W-181	9.7e-08	1.0e-08	4.9e-08	2.4e-07	3.5e-07	1.9e-08	2.1e-09	9.9e-09	5.0e-08	7.1e-08
W-185	4.3e-07	4.6e-08	2.2e-07	1.1e-06	1.5e-06	8.5e-08	9.1e-09	4.4e-08	2.2e-07	3.1e-07
Os-185	4.4e-04	5.3e-05	2.5e-04	1.1e-03	1.5e-03	8.7e-05	1.1e-05	4.7e-05	2.1e-04	3.0e-04
Ir-192	1.5e-05	1.8e-06	8.3e-06	3.7e-05	5.3e-05	3.1e-06	3.5e-07	1.7e-06	7.4e-06	1.0e-05
Tl-204	1.4e-04	1.7e-05	7.5e-05	3.2e-04	4.7e-04	2.7e-05	3.3e-06	1.5e-05	6.5e-05	9.4e-05
Pb-210	1.3e+00	1.6e-01	7.0e-01	3.1e+00	4.5e+00	2.5e-01	3.2e-02	1.4e-01	6.1e-01	8.8e-01
Bi-207	1.1e-03	1.4e-04	6.4e-04	2.7e-03	4.0e-03	2.3e-04	2.8e-05	1.3e-04	5.5e-04	7.9e-04
Po-210	4.1e-01	5.0e-02	2.3e-01	9.9e-01	1.4e+00	8.1e-02	1.0e-02	4.5e-02	1.9e-01	2.8e-01
Ra-226	2.5e-02	2.9e-03	1.4e-02	6.2e-02	8.3e-02	5.0e-03	5.7e-04	2.7e-03	1.2e-02	1.7e-02
Ra-228	4.9e-02	4.9e-03	2.7e-02	1.2e-01	1.7e-01	9.8e-03	9.7e-04	5.3e-03	2.3e-02	3.3e-02
Ac-227	3.9e+00	4.3e-01	2.0e+00	9.2e+00	1.4e+01	7.6e-01	8.6e-02	4.1e-01	1.8e+00	2.7e+00
Th-228	1.0e+00	1.1e-01	5.5e-01	2.4e+00	3.4e+00	2.0e-01	2.1e-02	1.1e-01	4.6e-01	7.4e-01
Th-229	5.2e+00	5.6e-01	2.9e+00	1.3e+01	1.8e+01	1.0e+00	1.1e-01	5.6e-01	2.4e+00	3.9e+00
Th-230	7.9e-01	8.4e-02	4.3e-01	1.9e+00	2.7e+00	1.6e-01	1.7e-02	8.5e-02	3.5e-01	5.8e-01
Th-232	3.5e+00	3.7e-01	1.9e+00	8.4e+00	1.2e+01	6.8e-01	7.5e-02	3.7e-01	1.6e+00	2.5e+00
Pa-231	2.6e+00	3.0e-01	1.4e+00	6.4e+00	8.8e+00	5.0e-01	5.9e-02	2.7e-01	1.2e+00	1.8e+00
U-232	2.0e+00	2.4e-01	1.1e+00	4.8e+00	7.0e+00	3.9e-01	4.6e-02	2.1e-01	9.1e-01	1.5e+00
U-233	4.0e-01	4.6e-02	2.2e-01	9.6e-01	1.4e+00	8.0e-02	9.3e-03	4.2e-02	1.9e-01	3.0e-01
U-234	4.0e-01	4.6e-02	2.1e-01	9.4e-01	1.4e+00	7.8e-02	9.1e-03	4.1e-02	1.8e-01	2.9e-01
U-235	3.7e-01	4.3e-02	2.0e-01	8.7e-01	1.3e+00	7.2e-02	8.5e-03	3.8e-02	1.7e-01	2.7e-01
U-236	3.7e-01	4.4e-02	2.0e-01	8.9e-01	1.3e+00	7.4e-02	8.6e-03	3.9e-02	1.7e-01	2.8e-01
U-238	3.5e-01	4.2e-02	1.9e-01	8.4e-01	1.2e+00	7.0e-02	8.1e-03	3.7e-02	1.6e-01	2.6e-01
Np-237	1.6e+00	1.8e-01	9.0e-01	3.7e+00	5.6e+00	3.1e-01	3.5e-02	1.6e-01	7.1e-01	1.1e+00
Pu-236	3.7e-01	4.1e-02	2.1e-01	8.7e-01	1.2e+00	7.3e-02	8.3e-03	4.2e-02	1.7e-01	2.5e-01
Pu-238	8.4e-01	9.4e-02	4.8e-01	2.0e+00	2.8e+00	1.6e-01	1.9e-02	9.5e-02	3.9e-01	5.6e-01
Pu-239	8.9e-01	1.0e-01	5.1e-01	2.1e+00	3.0e+00	1.8e-01	2.0e-02	1.0e-01	4.2e-01	6.0e-01
Pu-240	8.9e-01	1.0e-01	5.1e-01	2.1e+00	3.0e+00	1.8e-01	2.0e-02	1.0e-01	4.2e-01	6.0e-01
Pu-241	1.5e-02	1.8e-03	8.9e-03	3.4e-02	4.9e-02	2.9e-03	3.3e-04	1.6e-03	6.8e-03	9.7e-03
Pu-242	8.5e-01	9.6e-02	4.9e-01	2.0e+00	2.9e+00	1.7e-01	1.9e-02	9.6e-02	4.0e-01	5.7e-01
Pu-244	8.4e-01	9.5e-02	4.8e-01	2.0e+00	2.8e+00	1.7e-01	1.9e-02	9.5e-02	3.9e-01	5.6e-01
Am-241	1.3e+00	1.5e-01	7.0e-01	3.1e+00	4.9e+00	2.6e-01	3.0e-02	1.4e-01	5.9e-01	9.4e-01
Am-242m	1.3e+00	1.5e-01	6.9e-01	3.0e+00	4.9e+00	2.6e-01	3.0e-02	1.4e-01	5.8e-01	9.3e-01
Am-243	1.3e+00	1.5e-01	6.9e-01	3.0e+00	4.9e+00	2.6e-01	3.0e-02	1.4e-01	5.9e-01	9.3e-01
Cm-242	4.4e-02	5.2e-03	2.4e-02	1.1e-01	1.6e-01	8.7e-03	1.1e-03	4.8e-03	2.2e-02	3.1e-02
Cm-243	9.0e-01	1.1e-01	5.0e-01	2.2e+00	3.2e+00	1.8e-01	2.1e-02	9.6e-02	4.4e-01	6.2e-01
Cm-244	7.3e-01	8.5e-02	4.0e-01	1.8e+00	2.6e+00	1.4e-01	1.7e-02	7.7e-02	3.6e-01	5.0e-01
Cm-245	1.3e+00	1.6e-01	7.4e-01	3.3e+00	4.8e+00	2.6e-01	3.2e-02	1.4e-01	6.6e-01	9.3e-01
Cm-246	1.3e+00	1.6e-01	7.4e-01	3.3e+00	4.7e+00	2.6e-01	3.1e-02	1.4e-01	6.5e-01	9.2e-01
Cm-247	1.2e+00	1.4e-01	6.8e-01	3.0e+00	4.4e+00	2.4e-01	2.9e-02	1.3e-01	6.0e-01	8.4e-01
Cm-248	4.9e+00	5.7e-01	2.7e+00	1.2e+01	1.7e+01	9.6e-01	1.1e-01	5.2e-01	2.4e+00	3.4e+00
Bk-249	4.1e-03	4.7e-04	2.2e-03	1.0e-02	1.5e-02	8.1e-04	9.2e-05	4.3e-04	2.0e-03	2.9e-03
Cf-248	1.4e-01	1.5e-02	7.3e-02	3.4e-01	5.1e-01	2.8e-02	3.1e-03	1.5e-02	6.5e-02	1.0e-01
Cf-249	1.1e+00	1.2e-01	5.8e-01	2.7e+00	4.1e+00	2.2e-01	2.5e-02	1.2e-01	5.2e-01	8.0e-01
Cf-250	6.1e-01	6.3e-02	3.1e-01	1.4e+00	2.2e+00	1.2e-01	1.3e-02	6.3e-02	2.8e-01	4.3e-01
Cf-251	1.1e+00	1.2e-01	6.0e-01	2.7e+00	4.2e+00	2.3e-01	2.5e-02	1.2e-01	5.3e-01	8.1e-01
Cf-252	4.5e-01	4.7e-02	2.3e-01	1.1e+00	1.6e+00	8.9e-02	9.8e-03	4.7e-02	2.1e-01	3.2e-01
Cf-254	5.8e-01	6.5e-02	3.1e-01	1.3e+00	2.1e+00	1.1e-01	1.3e-02	6.0e-02	2.7e-01	4.0e-01
Es-254	1.1e-01	1.2e-02	5.3e-02	2.6e-01	4.0e-01	2.2e-02	2.6e-03	1.3e-02	5.1e-02	7.5e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.47 Normalized effective dose equivalents from ingestion: EAF dust-dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.7e-04	2.1e-05	3.2e-04	1.3e-03	2.0e-03	1.1e-04	4.3e-06	6.3e-05	2.5e-04	3.8e-04
P-32	6.2e-06	1.5e-07	2.9e-06	1.5e-05	2.5e-05	1.2e-06	2.8e-08	5.7e-07	3.0e-06	5.1e-06
S-35	1.0e-06	3.4e-08	5.5e-07	2.6e-06	3.6e-06	2.0e-07	6.7e-09	1.1e-07	5.0e-07	7.0e-07
Cl-36	6.7e-05	1.9e-06	3.9e-05	1.6e-04	2.4e-04	1.3e-05	4.1e-07	7.6e-06	3.0e-05	4.6e-05
K-40	9.4e-04	3.5e-05	5.4e-04	2.1e-03	3.3e-03	1.9e-04	8.0e-06	1.0e-04	4.2e-04	6.2e-04
Ca-41	6.4e-06	2.6e-07	3.6e-06	1.5e-05	2.3e-05	1.3e-06	5.3e-08	7.1e-07	2.8e-06	4.5e-06
Ca-45	1.4e-05	5.0e-07	7.5e-06	3.0e-05	4.9e-05	2.7e-06	1.1e-07	1.6e-06	5.9e-06	9.6e-06
Sc-46	2.4e-05	6.5e-07	1.3e-05	5.4e-05	8.6e-05	4.7e-06	1.6e-07	2.6e-06	1.1e-05	1.6e-05
Cr-51	1.5e-07	4.4e-09	8.3e-08	3.5e-07	5.5e-07	3.0e-08	8.8e-10	1.7e-08	6.8e-08	1.1e-07
Mn-53	4.0e-07	1.5e-08	2.2e-07	9.1e-07	1.3e-06	7.8e-08	3.3e-09	4.4e-08	1.8e-07	2.7e-07
Mn-54	9.4e-06	3.6e-07	5.2e-06	2.2e-05	3.2e-05	1.9e-06	7.9e-08	1.0e-06	4.2e-06	6.2e-06
Fe-55	7.6e-07	2.8e-08	4.3e-07	1.7e-06	2.7e-06	1.5e-07	5.2e-09	8.3e-08	3.5e-07	5.3e-07
Fe-59	5.0e-06	1.8e-07	2.8e-06	1.1e-05	1.9e-05	9.8e-07	3.6e-08	5.5e-07	2.2e-06	3.8e-06
Co-56	9.7e-06	3.7e-07	5.3e-06	2.2e-05	3.8e-05	1.9e-06	6.4e-08	1.1e-06	4.3e-06	7.1e-06
Co-57	8.9e-07	3.4e-08	4.9e-07	2.0e-06	3.3e-06	1.8e-07	6.5e-09	9.7e-08	3.9e-07	6.5e-07
Co-58	2.8e-06	1.1e-07	1.5e-06	6.4e-06	1.1e-05	5.5e-07	1.9e-08	3.0e-07	1.3e-06	2.0e-06
Co-60	1.3e-05	5.2e-07	7.2e-06	3.0e-05	4.9e-05	2.6e-06	9.6e-08	1.4e-06	6.0e-06	9.3e-06
Ni-59	2.7e-07	9.5e-09	1.5e-07	6.5e-07	9.7e-07	5.4e-08	1.8e-09	2.9e-08	1.2e-07	1.9e-07
Ni-63	7.5e-07	2.6e-08	4.1e-07	1.8e-06	2.7e-06	1.5e-07	4.9e-09	7.9e-08	3.4e-07	5.2e-07
Zn-65	1.2e-03	4.7e-05	7.1e-04	2.9e-03	4.3e-03	2.4e-04	1.0e-05	1.4e-04	5.6e-04	7.9e-04
As-73	1.9e-05	6.3e-07	1.0e-05	4.5e-05	6.3e-05	3.7e-06	1.3e-07	2.1e-06	8.6e-06	1.3e-05
Se-75	7.6e-04	3.0e-05	4.4e-04	1.8e-03	2.6e-03	1.5e-04	6.3e-06	8.6e-05	3.5e-04	5.0e-04
Sr-85	6.7e-06	2.4e-07	3.8e-06	1.6e-05	2.5e-05	1.3e-06	4.7e-08	7.5e-07	3.1e-06	4.6e-06
Sr-89	2.8e-05	9.8e-07	1.6e-05	6.9e-05	1.0e-04	5.6e-06	2.0e-07	3.1e-06	1.3e-05	1.9e-05
Sr-90	7.6e-04	2.8e-05	4.2e-04	1.8e-03	2.8e-03	1.5e-04	5.5e-06	8.3e-05	3.5e-04	5.4e-04
Y-91	3.1e-05	1.1e-06	1.7e-05	7.2e-05	1.1e-04	6.1e-06	2.0e-07	3.4e-06	1.4e-05	2.1e-05
Zr-93	8.5e-06	3.0e-07	4.9e-06	2.0e-05	2.9e-05	1.7e-06	6.2e-08	9.4e-07	3.8e-06	5.5e-06
Zr-95	1.8e-05	6.4e-07	1.0e-05	4.2e-05	6.1e-05	3.6e-06	1.3e-07	2.0e-06	8.2e-06	1.2e-05
Nb-93m	2.5e-06	9.7e-08	1.5e-06	5.8e-06	8.7e-06	5.0e-07	2.1e-08	2.8e-07	1.1e-06	1.7e-06
Nb-94	3.5e-05	1.3e-06	2.0e-05	8.0e-05	1.2e-04	6.9e-06	2.9e-07	3.9e-06	1.5e-05	2.3e-05
Nb-95	6.4e-06	2.3e-07	3.5e-06	1.5e-05	2.3e-05	1.3e-06	4.6e-08	7.0e-07	3.0e-06	4.5e-06
Mo-93	1.8e-06	5.9e-08	1.1e-06	4.3e-06	6.0e-06	3.6e-07	1.1e-08	2.0e-07	8.3e-07	1.2e-06
Tc-97	2.2e-07	8.2e-09	1.3e-07	5.2e-07	7.8e-07	4.4e-08	1.5e-09	2.5e-08	1.0e-07	1.5e-07
Tc-97m	1.2e-06	4.5e-08	7.1e-07	2.8e-06	4.5e-06	2.4e-07	8.8e-09	1.4e-07	5.6e-07	8.3e-07
Tc-99	1.9e-06	7.0e-08	1.1e-06	4.5e-06	6.7e-06	3.8e-07	1.3e-08	2.2e-07	8.8e-07	1.3e-06
Ru-103	2.2e-06	6.9e-08	1.2e-06	4.8e-06	8.6e-06	4.4e-07	1.3e-08	2.3e-07	9.8e-07	1.7e-06
Ru-106	3.4e-05	1.4e-06	1.9e-05	8.0e-05	1.2e-04	6.8e-06	2.7e-07	3.7e-06	1.6e-05	2.5e-05
Ag-108m	1.2e-04	3.6e-06	6.2e-05	2.6e-04	4.1e-04	2.3e-05	7.7e-07	1.2e-05	5.1e-05	8.2e-05
Ag-110m	1.5e-04	4.6e-06	8.0e-05	3.3e-04	5.1e-04	2.9e-05	9.5e-07	1.6e-05	6.4e-05	1.0e-04
Cd-109	1.3e-03	5.0e-05	7.3e-04	2.9e-03	4.4e-03	2.5e-04	1.0e-05	1.4e-04	5.6e-04	8.1e-04
Sn-113	3.4e-06	1.2e-07	1.8e-06	8.1e-06	1.1e-05	6.6e-07	2.4e-08	3.6e-07	1.5e-06	2.3e-06
Sb-124	8.4e-05	2.1e-06	4.6e-05	2.1e-04	3.2e-04	1.7e-05	4.8e-07	8.8e-06	4.0e-05	6.7e-05
Sb-125	4.4e-05	1.2e-06	2.3e-05	1.1e-04	1.6e-04	8.7e-06	2.4e-07	4.5e-06	2.0e-05	3.2e-05
Te-123m	4.5e-04	1.8e-05	2.7e-04	1.0e-03	1.6e-03	8.9e-05	3.8e-06	5.1e-05	2.0e-04	2.9e-04
Te-127m	6.9e-04	2.7e-05	4.1e-04	1.6e-03	2.4e-03	1.4e-04	5.7e-06	7.8e-05	3.1e-04	4.5e-04
I-125	6.2e-04	1.8e-05	2.9e-04	1.4e-03	2.4e-03	1.2e-04	3.4e-06	5.8e-05	2.9e-04	4.9e-04
I-129	6.6e-03	1.8e-04	3.1e-03	1.5e-02	2.6e-02	1.3e-03	3.8e-05	6.0e-04	2.9e-03	5.0e-03
I-131	1.2e-04	6.6e-07	2.7e-05	2.9e-04	5.1e-04	2.3e-05	1.9e-07	5.4e-06	5.6e-05	9.6e-05
Cs-134	7.0e-03	2.7e-04	4.1e-03	1.6e-02	2.4e-02	1.4e-03	5.7e-05	7.9e-04	3.1e-03	4.5e-03
Cs-135	7.0e-04	2.7e-05	4.0e-04	1.6e-03	2.4e-03	1.4e-04	5.6e-06	7.9e-05	3.2e-04	4.5e-04
Cs-137	4.9e-03	1.9e-04	2.9e-03	1.1e-02	1.7e-02	9.8e-04	4.0e-05	5.6e-04	2.2e-03	3.2e-03
Ba-133	1.7e-05	5.9e-07	9.4e-06	3.8e-05	5.9e-05	3.3e-06	1.2e-07	1.9e-06	7.4e-06	1.1e-05
Ce-139	4.7e-06	1.6e-07	2.6e-06	1.1e-05	1.6e-05	9.3e-07	3.3e-08	5.2e-07	2.2e-06	3.2e-06
Ce-141	7.0e-06	2.3e-07	3.6e-06	1.7e-05	2.4e-05	1.4e-06	4.5e-08	7.5e-07	3.4e-06	4.7e-06
Ce-144	9.6e-05	3.3e-06	5.3e-05	2.3e-04	3.2e-04	1.9e-05	6.4e-07	1.1e-05	4.5e-05	6.5e-05
Pm-147	5.1e-06	1.7e-07	2.8e-06	1.2e-05	1.8e-05	1.0e-06	3.3e-08	5.5e-07	2.3e-06	3.4e-06

Table F1.47 Normalized effective dose equivalents from ingestion: EAF dust–dump trailer

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-06	6.7e-08	1.1e-06	4.7e-06	6.9e-06	3.9e-07	1.3e-08	2.1e-07	9.1e-07	1.3e-06
Eu-152	3.2e-05	1.3e-06	1.8e-05	7.3e-05	1.1e-04	6.3e-06	2.5e-07	3.6e-06	1.5e-05	2.1e-05
Eu-154	4.7e-05	2.0e-06	2.7e-05	1.1e-04	1.6e-04	9.3e-06	3.6e-07	5.2e-06	2.2e-05	3.1e-05
Eu-155	7.5e-06	3.1e-07	4.3e-06	1.7e-05	2.5e-05	1.5e-06	5.8e-08	8.4e-07	3.5e-06	4.9e-06
Gd-153	5.3e-06	1.9e-07	3.1e-06	1.3e-05	1.8e-05	1.0e-06	3.8e-08	6.1e-07	2.5e-06	3.5e-06
Tb-160	2.4e-05	9.0e-07	1.3e-05	5.4e-05	8.3e-05	4.7e-06	1.9e-07	2.6e-06	1.0e-05	1.6e-05
Tm-170	2.1e-05	8.1e-07	1.2e-05	5.3e-05	7.2e-05	4.2e-06	1.5e-07	2.4e-06	1.0e-05	1.4e-05
Tm-171	2.0e-06	7.5e-08	1.2e-06	4.8e-06	6.9e-06	4.0e-07	1.4e-08	2.2e-07	9.3e-07	1.4e-06
Ta-182	2.6e-05	1.0e-06	1.4e-05	5.9e-05	9.2e-05	5.1e-06	1.9e-07	2.9e-06	1.2e-05	1.9e-05
W-181	3.1e-07	9.9e-09	1.7e-07	7.3e-07	1.1e-06	6.1e-08	2.0e-09	3.4e-08	1.5e-07	2.2e-07
W-185	1.5e-06	4.8e-08	8.4e-07	3.6e-06	5.5e-06	3.0e-07	1.0e-08	1.7e-07	7.2e-07	1.0e-06
Os-185	1.7e-04	6.7e-06	9.9e-05	3.9e-04	5.8e-04	3.3e-05	1.3e-06	1.9e-05	7.8e-05	1.1e-04
Ir-192	5.3e-06	1.7e-07	3.0e-06	1.2e-05	1.8e-05	1.0e-06	3.3e-08	5.9e-07	2.4e-06	3.6e-06
Tl-204	3.2e-04	1.2e-05	1.9e-04	7.5e-04	1.1e-03	6.4e-05	2.6e-06	3.6e-05	1.4e-04	2.1e-04
Pb-210	7.1e-01	2.8e-02	4.1e-01	1.6e+00	2.4e+00	1.4e-01	5.7e-03	8.0e-02	3.2e-01	4.6e-01
Bi-207	5.3e-04	2.1e-05	3.1e-04	1.2e-03	1.9e-03	1.1e-04	4.3e-06	6.1e-05	2.4e-04	3.4e-04
Po-210	1.6e-01	6.0e-03	9.0e-02	3.6e-01	5.4e-01	3.1e-02	1.3e-03	1.7e-02	7.1e-02	1.0e-01
Ra-226	6.8e-03	2.6e-04	3.8e-03	1.5e-02	2.6e-02	1.3e-03	4.9e-05	7.5e-04	3.1e-03	4.9e-03
Ra-228	7.3e-03	2.8e-04	4.2e-03	1.6e-02	2.8e-02	1.4e-03	5.3e-05	8.1e-04	3.3e-03	5.3e-03
Ac-227	7.4e-02	3.0e-03	4.2e-02	1.8e-01	2.8e-01	1.5e-02	5.9e-04	8.4e-03	3.4e-02	5.2e-02
Th-228	4.0e-03	1.3e-04	2.2e-03	9.5e-03	1.4e-02	7.8e-04	2.6e-05	4.1e-04	1.9e-03	2.7e-03
Th-229	2.1e-02	6.8e-04	1.1e-02	4.9e-02	7.4e-02	4.0e-03	1.3e-04	2.1e-03	9.4e-03	1.4e-02
Th-230	2.8e-03	9.2e-05	1.6e-03	6.6e-03	1.0e-02	5.5e-04	1.8e-05	2.9e-04	1.3e-03	1.9e-03
Th-232	1.4e-02	4.6e-04	7.8e-03	3.3e-02	5.0e-02	2.8e-03	9.2e-05	1.4e-03	6.4e-03	9.6e-03
Pa-231	5.3e-02	1.9e-03	2.9e-02	1.2e-01	1.7e-01	1.1e-02	4.2e-04	5.8e-03	2.2e-02	3.5e-02
U-232	4.9e-04	1.8e-05	2.8e-04	1.1e-03	1.8e-03	9.6e-05	3.6e-06	5.4e-05	2.1e-04	3.5e-04
U-233	1.3e-04	4.6e-06	7.5e-05	3.1e-04	5.0e-04	2.6e-05	1.0e-06	1.5e-05	5.8e-05	9.1e-05
U-234	1.3e-04	4.6e-06	7.4e-05	3.0e-04	4.9e-04	2.6e-05	9.9e-07	1.4e-05	5.7e-05	8.9e-05
U-235	1.4e-04	4.9e-06	7.9e-05	3.2e-04	5.3e-04	2.8e-05	1.1e-06	1.6e-05	6.1e-05	9.6e-05
U-236	1.2e-04	4.3e-06	7.0e-05	2.9e-04	4.6e-04	2.4e-05	9.3e-07	1.4e-05	5.4e-05	8.4e-05
U-238	1.9e-04	6.6e-06	1.1e-04	4.3e-04	7.0e-04	3.7e-05	1.4e-06	2.1e-05	8.2e-05	1.3e-04
Np-237	2.2e-02	8.8e-04	1.2e-02	5.1e-02	7.7e-02	4.3e-03	1.8e-04	2.4e-03	9.9e-03	1.5e-02
Pu-236	5.6e-03	2.0e-04	3.1e-03	1.3e-02	1.9e-02	1.1e-03	4.1e-05	6.1e-04	2.4e-03	3.6e-03
Pu-238	1.6e-02	5.7e-04	8.7e-03	3.6e-02	5.3e-02	3.1e-03	1.2e-04	1.7e-03	6.8e-03	1.0e-02
Pu-239	1.7e-02	6.3e-04	9.6e-03	4.0e-02	5.8e-02	3.4e-03	1.3e-04	1.9e-03	7.5e-03	1.1e-02
Pu-240	1.7e-02	6.3e-04	9.6e-03	4.0e-02	5.8e-02	3.4e-03	1.3e-04	1.9e-03	7.5e-03	1.1e-02
Pu-241	3.4e-04	1.2e-05	1.9e-04	7.7e-04	1.1e-03	6.6e-05	2.5e-06	3.7e-05	1.5e-04	2.2e-04
Pu-242	1.6e-02	6.0e-04	9.2e-03	3.8e-02	5.5e-02	3.2e-03	1.2e-04	1.8e-03	7.2e-03	1.1e-02
Pu-244	1.6e-02	5.9e-04	9.1e-03	3.7e-02	5.5e-02	3.2e-03	1.2e-04	1.8e-03	7.1e-03	1.0e-02
Am-241	1.8e-02	6.2e-04	1.0e-02	4.2e-02	5.7e-02	3.5e-03	1.2e-04	2.0e-03	7.9e-03	1.2e-02
Am-242m	1.8e-02	6.2e-04	1.0e-02	4.2e-02	5.7e-02	3.5e-03	1.2e-04	2.0e-03	7.9e-03	1.2e-02
Am-243	1.8e-02	6.2e-04	1.0e-02	4.2e-02	5.7e-02	3.5e-03	1.2e-04	2.0e-03	7.9e-03	1.2e-02
Cm-242	5.0e-04	1.9e-05	2.9e-04	1.1e-03	1.9e-03	9.9e-05	3.7e-06	5.6e-05	2.2e-04	3.6e-04
Cm-243	1.3e-02	4.4e-04	7.2e-03	2.8e-02	4.6e-02	2.5e-03	9.1e-05	1.4e-03	5.4e-03	8.9e-03
Cm-244	1.0e-02	3.6e-04	5.8e-03	2.2e-02	3.7e-02	2.0e-03	7.3e-05	1.1e-03	4.3e-03	7.2e-03
Cm-245	1.9e-02	6.6e-04	1.1e-02	4.1e-02	6.9e-02	3.7e-03	1.4e-04	2.0e-03	8.1e-03	1.3e-02
Cm-246	1.9e-02	6.6e-04	1.1e-02	4.1e-02	6.8e-02	3.6e-03	1.3e-04	2.0e-03	8.0e-03	1.3e-02
Cm-247	1.7e-02	6.1e-04	9.8e-03	3.8e-02	6.3e-02	3.4e-03	1.2e-04	1.9e-03	7.4e-03	1.2e-02
Cm-248	6.8e-02	2.4e-03	3.9e-02	1.5e-01	2.5e-01	1.3e-02	5.0e-04	7.5e-03	2.9e-02	4.9e-02
Bk-249	6.1e-05	2.4e-06	3.5e-05	1.4e-04	2.2e-04	1.2e-05	4.8e-07	6.7e-06	2.8e-05	4.2e-05
Cf-248	1.6e-03	5.8e-05	8.8e-04	3.7e-03	5.6e-03	3.1e-04	1.1e-05	1.7e-04	7.3e-04	1.1e-03
Cf-249	2.4e-02	8.6e-04	1.3e-02	5.5e-02	8.5e-02	4.6e-03	1.6e-04	2.6e-03	1.1e-02	1.6e-02
Cf-250	1.1e-02	3.9e-04	6.0e-03	2.5e-02	3.8e-02	2.1e-03	7.2e-05	1.2e-03	4.9e-03	7.4e-03
Cf-251	2.4e-02	8.8e-04	1.4e-02	5.7e-02	8.7e-02	4.8e-03	1.6e-04	2.6e-03	1.1e-02	1.7e-02
Cf-252	5.3e-03	1.9e-04	2.9e-03	1.2e-02	1.9e-02	1.0e-03	3.6e-05	5.7e-04	2.4e-03	3.7e-03
Cf-254	8.1e-03	3.0e-04	4.4e-03	1.9e-02	2.8e-02	1.6e-03	5.9e-05	8.5e-04	3.7e-03	5.5e-03
Es-254	1.5e-03	5.8e-05	7.9e-04	3.4e-03	5.2e-03	2.9e-04	1.1e-05	1.6e-04	6.2e-04	1.0e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.48 Normalized effective dose equivalents from all pathways: Metal product-driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	8.6e-07	2.9e-08	1.6e-07	2.0e-06	4.8e-06	1.7e-07	5.8e-09	3.2e-08	4.1e-07	9.5e-07
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.0e-04	2.6e-06	2.0e-05	1.9e-04	4.1e-04	2.0e-05	5.1e-07	4.0e-06	3.8e-05	8.1e-05
S-35	7.3e-06	4.9e-09	2.1e-06	1.6e-07	3.7e-07	1.4e-06	9.8e-10	4.2e-09	3.2e-08	7.2e-08
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.7e-03	1.7e-04	8.6e-04	9.7e-03	2.4e-02	9.3e-04	3.5e-05	1.7e-04	2.0e-03	4.7e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	3.0e-01	2.1e-03	1.2e-02	7.6e-01	2.0e+00	6.0e-02	4.1e-04	2.4e-03	1.5e-01	4.0e-01
Fe-55	2.5e-11	1.2e-12	8.5e-12	5.7e-11	1.3e-10	4.8e-12	2.4e-13	1.3e-12	1.1e-11	2.5e-11
Fe-59	3.4e-01	1.9e-02	8.7e-02	7.4e-01	1.7e+00	6.7e-02	3.8e-03	1.7e-02	1.5e-01	3.4e-01
Co-56	1.3e+00	7.5e-02	3.5e-01	3.0e+00	6.7e+00	2.6e-01	1.5e-02	7.0e-02	6.0e-01	1.4e+00
Co-57	1.7e-02	8.8e-04	4.5e-03	3.8e-02	8.7e-02	3.3e-03	1.7e-04	8.9e-04	7.7e-03	1.7e-02
Co-58	3.5e-01	2.0e-02	9.2e-02	7.8e-01	1.8e+00	6.9e-02	3.9e-03	1.8e-02	1.5e-01	3.5e-01
Co-60	1.4e+00	7.1e-02	3.7e-01	3.2e+00	7.1e+00	2.8e-01	1.4e-02	7.3e-02	6.4e-01	1.4e+00
Ni-59	8.5e-06	4.3e-07	2.3e-06	1.9e-05	4.3e-05	1.7e-06	8.4e-08	4.4e-07	3.9e-06	8.5e-06
Ni-63	3.9e-09	1.9e-10	1.0e-09	8.8e-09	2.0e-08	7.6e-10	3.8e-11	2.0e-10	1.8e-09	3.9e-09
Zn-65	8.9e-03	7.1e-04	4.4e-03	2.0e-02	3.2e-02	1.8e-03	1.4e-04	8.8e-04	3.9e-03	6.3e-03
As-73	3.9e-05	2.3e-06	1.1e-05	8.7e-05	1.9e-04	7.7e-06	4.6e-07	2.1e-06	1.7e-05	3.9e-05
Se-75	8.9e-02	2.5e-04	1.2e-03	1.8e-01	4.7e-01	1.4e-02	5.0e-05	2.4e-04	3.5e-02	9.3e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	3.2e-08	1.6e-09	8.6e-09	7.4e-08	1.6e-07	6.3e-09	3.2e-10	1.7e-09	1.5e-08	3.2e-08
Tc-97	8.6e-08	4.3e-09	2.3e-08	2.0e-07	4.4e-07	1.7e-08	8.6e-10	4.5e-09	3.9e-08	8.7e-08
Tc-97m	2.0e-05	1.1e-06	5.2e-06	4.4e-05	9.9e-05	3.9e-06	2.1e-07	1.0e-06	8.8e-06	2.0e-05
Tc-99	1.5e-05	7.5e-07	4.0e-06	3.4e-05	7.6e-05	2.9e-06	1.5e-07	7.8e-07	6.8e-06	1.5e-05
Ru-103	1.2e-01	7.0e-03	3.1e-02	2.7e-01	6.1e-01	2.4e-02	1.4e-03	6.2e-03	5.4e-02	1.2e-01
Ru-106	1.2e-01	6.0e-03	3.1e-02	2.7e-01	5.9e-01	2.3e-02	1.2e-03	6.1e-03	5.3e-02	1.1e-01
Ag-108m	8.3e-01	3.8e-02	2.0e-01	1.9e+00	4.3e+00	1.6e-01	7.6e-03	3.9e-02	3.9e-01	8.6e-01
Ag-110m	1.3e+00	6.1e-02	3.1e-01	3.0e+00	6.8e+00	2.5e-01	1.2e-02	6.0e-02	5.9e-01	1.3e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	9.6e-02	5.2e-03	2.6e-02	2.2e-01	4.9e-01	1.9e-02	1.0e-03	5.0e-03	4.3e-02	9.5e-02
Sb-124	1.6e-01	6.4e-03	9.1e-02	3.4e-01	5.1e-01	3.2e-02	1.3e-03	1.8e-02	6.6e-02	1.0e-01
Sb-125	5.6e-02	2.4e-03	3.3e-02	1.1e-01	1.7e-01	1.1e-02	4.8e-04	6.4e-03	2.2e-02	3.4e-02
Te-123m	7.1e-03	5.7e-05	2.8e-04	1.8e-02	4.7e-02	1.4e-03	1.1e-05	5.5e-05	3.6e-03	9.3e-03
Te-127m	5.7e-04	4.6e-06	2.2e-05	1.4e-03	3.7e-03	1.1e-04	9.1e-07	4.3e-06	2.9e-04	7.4e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.48 Normalized effective dose equivalents from all pathways: Metal product–driver

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	6.7e-04	3.6e-05	1.8e-04	1.5e-03	3.4e-03	1.3e-04	7.2e-06	3.5e-05	3.0e-04	6.7e-04
W-185	3.0e-05	1.7e-06	7.8e-06	6.6e-05	1.5e-04	5.8e-06	3.3e-07	1.6e-06	1.3e-05	3.0e-05
Os-185	8.8e-03	6.1e-04	2.5e-03	1.9e-02	4.5e-02	1.7e-03	1.2e-04	5.0e-04	3.9e-03	8.7e-03
Ir-192	2.6e-01	1.4e-02	6.8e-02	5.8e-01	1.3e+00	5.1e-02	2.9e-03	1.4e-02	1.1e-01	2.6e-01
Tl-204	1.3e-05	6.3e-07	3.0e-06	2.9e-05	6.5e-05	2.5e-06	1.3e-07	5.9e-07	5.9e-06	1.3e-05
Pb-210	3.3e-05	1.7e-06	7.7e-06	7.6e-05	1.7e-04	6.5e-06	3.3e-07	1.5e-06	1.5e-05	3.4e-05
Bi-207	2.9e-02	1.8e-03	8.3e-03	6.5e-02	1.4e-01	5.6e-03	3.7e-04	1.6e-03	1.3e-02	2.8e-02
Po-210	4.8e-08	0.0e+00	2.6e-08	1.0e-07	1.6e-07	9.5e-09	0.0e+00	5.1e-09	2.0e-08	3.1e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.49 Normalized effective dose equivalents from all pathways: Dust disposal-Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	6.6e-08	0.0e+00	6.6e-10	1.0e-07	2.2e-07	1.3e-08	0.0e+00	1.3e-10	2.0e-08	4.2e-08
Na-22	9.9e+00	2.3e-01	3.3e+00	2.1e+01	3.1e+01	1.9e+00	4.5e-02	6.5e-01	4.1e+00	6.0e+00
P-32	1.1e-04	1.2e-06	3.0e-05	2.4e-04	3.9e-04	2.1e-05	2.3e-07	5.9e-06	4.7e-05	7.6e-05
S-35	4.1e-07	7.2e-09	1.3e-07	9.0e-07	1.4e-06	8.0e-08	1.4e-09	2.7e-08	1.8e-07	2.7e-07
Cl-36	6.8e-04	9.4e-06	2.0e-04	1.5e-03	2.5e-03	1.3e-04	1.8e-06	4.0e-05	3.0e-04	4.9e-04
K-40	7.5e-01	1.8e-02	2.5e-01	1.6e+00	2.3e+00	1.5e-01	3.5e-03	5.0e-02	3.2e-01	4.5e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	3.2e-06	5.8e-08	1.1e-06	7.0e-06	1.1e-05	6.3e-07	1.1e-08	2.1e-07	1.4e-06	2.2e-06
Sc-46	5.7e-01	9.9e-03	1.9e-01	1.2e+00	1.9e+00	1.1e-01	1.9e-03	3.8e-02	2.4e-01	3.8e-01
Cr-51	1.5e-03	5.4e-06	3.6e-04	3.8e-03	6.0e-03	2.9e-04	1.1e-06	7.1e-05	7.5e-04	1.2e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-01	4.3e-04	2.9e-02	3.4e-01	5.5e-01	2.4e-02	8.4e-05	5.5e-03	6.6e-02	1.1e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	5.1e-02	3.1e-04	1.4e-02	1.2e-01	1.8e-01	1.0e-02	6.3e-05	2.8e-03	2.3e-02	3.6e-02
Co-56	1.8e-01	1.5e-03	5.5e-02	4.7e-01	7.1e-01	3.6e-02	3.0e-04	1.1e-02	9.2e-02	1.4e-01
Co-57	4.7e-03	4.2e-05	1.4e-03	1.2e-02	1.8e-02	9.3e-04	8.0e-06	2.8e-04	2.3e-03	3.6e-03
Co-58	4.5e-02	3.8e-04	1.3e-02	1.2e-01	1.7e-01	8.8e-03	7.4e-05	2.7e-03	2.3e-02	3.5e-02
Co-60	1.6e-01	1.4e-03	5.0e-02	4.1e-01	6.3e-01	3.2e-02	2.8e-04	9.9e-03	8.0e-02	1.3e-01
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	3.8e+00	7.6e-02	1.3e+00	8.3e+00	1.2e+01	7.4e-01	1.5e-02	2.6e-01	1.6e+00	2.4e+00
As-73	2.9e-03	5.5e-05	9.6e-04	6.1e-03	9.7e-03	5.7e-04	1.1e-05	1.9e-04	1.2e-03	1.9e-03
Se-75	1.0e+00	3.7e-03	2.3e-01	3.1e+00	4.9e+00	2.1e-01	7.2e-04	4.5e-02	6.0e-01	1.0e+00
Sr-85	1.3e-01	2.2e-03	4.1e-02	2.7e-01	4.1e-01	2.5e-02	4.2e-04	8.1e-03	5.3e-02	8.1e-02
Sr-89	3.5e-04	5.8e-06	1.1e-04	7.5e-04	1.2e-03	6.9e-05	1.1e-06	2.2e-05	1.5e-04	2.3e-04
Sr-90	1.4e-03	2.6e-05	4.8e-04	3.1e-03	4.7e-03	2.8e-04	5.2e-06	9.6e-05	6.2e-04	9.2e-04
Y-91	1.3e-03	2.3e-05	4.3e-04	2.9e-03	4.3e-03	2.5e-04	4.6e-06	8.6e-05	5.6e-04	8.6e-04
Zr-93	2.2e-08	3.8e-10	6.7e-09	4.6e-08	7.4e-08	4.3e-09	7.3e-11	1.3e-09	9.2e-09	1.4e-08
Zr-95	2.9e-01	5.0e-03	9.7e-02	6.2e-01	9.7e-01	5.7e-02	9.8e-04	1.9e-02	1.2e-01	1.9e-01
Nb-93m	6.0e-06	1.1e-07	2.1e-06	1.3e-05	2.0e-05	1.2e-06	2.3e-08	4.1e-07	2.6e-06	4.0e-06
Nb-94	5.6e-01	1.1e-02	1.9e-01	1.2e+00	1.9e+00	1.1e-01	2.1e-03	3.8e-02	2.4e-01	3.7e-01
Nb-95	1.5e-01	2.4e-03	4.8e-02	3.3e-01	5.0e-01	2.9e-02	4.7e-04	9.5e-03	6.5e-02	9.9e-02
Mo-93	6.8e-06	4.6e-08	1.9e-06	1.5e-05	2.3e-05	1.3e-06	9.1e-09	3.7e-07	3.1e-06	4.6e-06
Tc-97	9.1e-06	7.3e-08	2.5e-06	1.2e-05	3.2e-05	1.8e-06	1.5e-08	5.0e-07	4.0e-06	6.4e-06
Tc-97m	1.7e-05	1.3e-07	4.6e-06	3.8e-05	5.9e-05	3.3e-06	2.6e-08	9.0e-07	7.5e-06	1.2e-05
Tc-99	1.4e-06	1.1e-08	4.0e-07	3.2e-06	5.0e-06	2.8e-07	2.3e-09	7.7e-08	6.2e-07	9.9e-07
Ru-103	1.8e-02	1.1e-04	4.9e-03	4.0e-02	6.4e-02	3.4e-03	2.2e-05	9.7e-04	8.0e-03	1.2e-02
Ru-106	1.3e-02	9.5e-05	3.9e-03	3.0e-02	4.7e-02	2.6e-03	1.9e-05	7.6e-04	5.9e-03	9.2e-03
Ag-108m	7.9e-01	8.1e-04	1.2e-01	2.3e+00	3.8e+00	1.6e-01	1.7e-04	2.4e-02	4.6e-01	7.5e-01
Ag-110m	1.3e+00	1.3e-03	2.0e-01	3.8e+00	6.2e+00	2.5e-01	2.6e-04	3.9e-02	7.5e-01	1.2e+00
Cd-109	3.0e-02	5.8e-04	1.1e-02	6.6e-02	1.0e-01	5.9e-03	1.1e-04	2.1e-03	1.3e-02	2.0e-02
Sn-113	1.8e-02	3.8e-04	6.0e-03	3.8e-02	5.9e-02	3.6e-03	7.7e-05	1.2e-03	7.5e-03	1.1e-02
Sb-124	5.0e+00	7.7e-02	9.3e-01	8.0e+00	1.5e+01	9.8e-01	1.6e-02	1.8e-01	1.6e+00	3.0e+00
Sb-125	1.5e+00	2.3e-02	2.8e-01	2.5e+00	4.8e+00	3.0e-01	4.7e-03	5.4e-02	4.9e-01	9.5e-01
Te-123m	4.8e-01	6.9e-03	1.6e-01	1.1e+00	1.8e+00	9.5e-02	1.4e-03	3.3e-02	2.2e-01	3.6e-01
Te-127m	2.5e-02	3.6e-04	8.6e-03	5.9e-02	9.6e-02	5.0e-03	7.1e-05	1.7e-03	1.2e-02	1.9e-02
I-125	3.1e-03	4.4e-05	9.5e-04	7.2e-03	1.2e-02	6.1e-04	8.4e-06	1.9e-04	1.4e-03	2.3e-03
I-129	3.5e-03	5.2e-05	1.1e-03	8.0e-03	1.3e-02	6.9e-04	1.0e-05	2.1e-04	1.6e-03	2.6e-03
I-131	6.1e-02	2.0e-04	1.1e-02	1.3e-01	2.3e-01	1.2e-02	4.0e-05	2.2e-03	2.6e-02	4.6e-02
Cs-134	9.4e+00	1.6e-01	3.4e+00	2.1e+01	3.4e+01	1.8e+00	3.1e-02	6.6e-01	4.2e+00	6.7e+00
Cs-135	3.9e-05	6.5e-07	1.4e-05	8.8e-05	1.4e-04	7.7e-06	1.3e-07	2.8e-06	1.7e-05	2.8e-05
Cs-137	3.5e+00	5.8e-02	1.2e+00	7.8e+00	1.3e+01	6.8e-01	1.2e-02	2.4e-01	1.5e+00	2.5e+00
Ba-133	1.1e-01	2.1e-03	3.9e-02	2.5e-01	3.8e-01	2.2e-02	4.1e-04	7.8e-03	5.0e-02	7.5e-02
Ce-139	3.1e-02	5.7e-04	1.1e-02	7.0e-02	1.1e-01	6.1e-03	1.1e-04	2.1e-03	1.4e-02	2.1e-02
Ce-141	9.5e-03	1.5e-04	3.1e-03	2.1e-02	3.3e-02	1.9e-03	2.9e-05	6.1e-04	4.2e-03	6.6e-03
Ce-144	1.7e-02	3.1e-04	5.8e-03	3.8e-02	5.9e-02	3.3e-03	6.1e-05	1.2e-03	7.5e-03	1.2e-02
Pm-147	2.8e-06	5.3e-08	9.6e-07	6.4e-06	9.6e-06	5.6e-07	1.1e-08	1.9e-07	1.3e-06	1.9e-06

Table F1.49 Normalized effective dose equivalents from all pathways: Dust disposal-industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.7e-08	1.1e-09	1.9e-08	1.3e-07	1.9e-07	1.1e-08	2.1e-10	3.8e-09	2.5e-08	3.8e-08
Eu-152	4.2e-01	7.6e-03	1.4e-01	8.9e-01	1.4e+00	8.2e-02	1.5e-03	2.7e-02	1.7e-01	2.7e-01
Eu-154	4.5e-01	8.3e-03	1.5e-01	9.8e-01	1.5e+00	8.9e-02	1.6e-03	3.0e-02	1.9e-01	2.9e-01
Eu-155	1.1e-02	2.0e-04	3.5e-03	2.3e-02	3.5e-02	2.1e-03	3.9e-05	7.0e-04	4.5e-03	6.9e-03
Gd-153	1.3e-02	2.4e-04	4.4e-03	2.8e-02	4.3e-02	2.5e-03	4.7e-05	8.7e-04	5.6e-03	8.6e-03
Tb-160	2.9e-01	5.1e-03	1.0e-01	6.6e-01	1.0e+00	5.8e-02	1.0e-03	2.0e-02	1.3e-01	2.0e-01
Tm-170	7.4e-04	1.3e-05	2.5e-04	1.6e-03	2.5e-03	1.5e-04	2.6e-06	5.0e-05	3.2e-04	5.0e-04
Tm-171	6.4e-05	1.2e-06	2.2e-05	1.4e-04	2.2e-04	1.2e-05	2.3e-07	4.3e-06	2.7e-05	4.3e-05
Ta-182	3.9e-01	6.8e-03	1.3e-01	8.3e-01	1.3e+00	7.7e-02	1.3e-03	2.6e-02	1.6e-01	2.5e-01
W-181	7.2e-04	5.4e-06	2.0e-04	1.7e-03	2.6e-03	1.4e-04	1.0e-06	4.0e-05	3.3e-04	5.0e-04
W-185	3.7e-06	2.7e-08	1.0e-06	8.6e-06	1.3e-05	7.2e-07	5.2e-09	2.0e-07	1.7e-06	2.5e-06
Os-185	3.7e+00	7.0e-02	1.3e+00	8.2e+00	1.2e+01	7.3e-01	1.4e-02	2.6e-01	1.6e+00	2.5e+00
Ir-192	3.6e-02	2.5e-04	1.1e-02	9.1e-02	1.4e-01	7.2e-03	5.1e-05	2.1e-03	1.8e-02	2.8e-02
Tl-204	4.5e-03	8.9e-05	1.6e-03	9.9e-03	1.5e-02	8.8e-04	1.7e-05	3.1e-04	1.9e-03	3.0e-03
Pb-210	6.8e-03	1.3e-04	2.4e-03	1.5e-02	2.3e-02	1.3e-03	2.6e-05	4.8e-04	3.0e-03	4.6e-03
Bi-207	1.1e+01	2.1e-01	3.7e+00	2.3e+01	3.5e+01	2.1e+00	4.0e-02	7.4e-01	4.6e+00	7.0e+00
Po-210	5.1e-05	9.9e-07	1.8e-05	1.1e-04	1.7e-04	1.0e-05	2.0e-07	3.6e-06	2.2e-05	3.3e-05
Ra-226	6.7e-01	1.2e-02	2.2e-01	1.4e+00	2.2e+00	1.3e-01	2.3e-03	4.4e-02	2.8e-01	4.4e-01
Ra-228	3.8e-01	6.6e-03	1.2e-01	7.8e-01	1.2e+00	7.4e-02	1.3e-03	2.4e-02	1.5e-01	2.4e-01
Ac-227	1.1e-01	2.2e-03	3.9e-02	2.5e-01	3.9e-01	2.2e-02	4.3e-04	7.8e-03	5.0e-02	7.6e-02
Th-228	5.8e-01	1.1e-02	2.0e-01	1.2e+00	1.9e+00	1.1e-01	2.1e-03	3.9e-02	2.5e-01	3.8e-01
Th-229	9.3e-02	1.7e-03	3.1e-02	2.0e-01	3.1e-01	1.8e-02	3.3e-04	6.2e-03	3.9e-02	6.1e-02
Th-230	9.5e-05	1.8e-06	3.2e-05	2.0e-04	3.2e-04	1.9e-05	3.5e-07	6.4e-06	4.0e-05	6.2e-05
Th-232	3.8e-03	6.7e-05	1.2e-03	8.2e-03	1.3e-02	7.5e-04	1.3e-05	2.4e-04	1.6e-03	2.6e-03
Pa-231	1.1e-02	2.2e-04	3.9e-03	2.5e-02	3.8e-02	2.2e-03	4.3e-05	7.7e-04	5.0e-03	7.4e-03
U-232	1.8e-02	3.3e-04	5.8e-03	4.1e-02	6.5e-02	3.6e-03	6.4e-05	1.1e-03	7.9e-03	1.3e-02
U-233	8.2e-05	1.5e-06	2.7e-05	1.8e-04	2.8e-04	1.6e-05	2.9e-07	5.5e-06	3.6e-05	5.5e-05
U-234	2.3e-05	4.3e-07	7.8e-06	5.2e-05	8.0e-05	4.6e-06	8.4e-08	1.6e-06	1.0e-05	1.6e-05
U-235	4.4e-02	8.1e-04	1.5e-02	9.8e-02	1.5e-01	8.6e-03	1.6e-04	2.9e-03	1.9e-02	3.0e-02
U-236	1.2e-05	2.3e-07	4.2e-06	2.8e-05	4.3e-05	2.4e-06	4.5e-08	8.4e-07	5.5e-06	8.4e-06
U-238	7.7e-03	1.4e-04	2.6e-03	1.7e-02	2.6e-02	1.5e-03	2.8e-05	5.2e-04	3.4e-03	5.2e-03
Np-237	6.4e-02	1.2e-03	2.2e-02	1.4e-01	2.2e-01	1.3e-02	2.3e-04	4.3e-03	2.7e-02	4.3e-02
Pu-236	2.3e-05	4.4e-07	7.2e-06	4.8e-05	7.6e-05	4.4e-06	8.4e-08	1.4e-06	9.5e-06	1.5e-05
Pu-238	8.9e-06	1.7e-07	3.0e-06	1.9e-05	3.0e-05	1.7e-06	3.2e-08	5.9e-07	3.8e-06	5.8e-06
Pu-239	1.7e-05	3.2e-07	5.8e-06	3.8e-05	5.8e-05	3.4e-06	6.3e-08	1.2e-06	7.4e-06	1.1e-05
Pu-240	8.6e-06	1.6e-07	2.9e-06	1.9e-05	2.9e-05	1.7e-06	3.1e-08	5.7e-07	3.7e-06	5.7e-06
Pu-241	7.0e-07	1.3e-08	2.3e-07	1.5e-06	2.4e-06	1.4e-07	2.6e-09	4.6e-08	3.0e-07	4.7e-07
Pu-242	7.5e-06	1.4e-07	2.5e-06	1.6e-05	2.5e-05	1.5e-06	2.7e-08	5.0e-07	3.2e-06	4.9e-06
Pu-244	1.2e-01	2.2e-03	4.0e-02	2.6e-01	4.0e-01	2.3e-02	4.3e-04	7.9e-03	5.1e-02	7.8e-02
Am-241	2.6e-03	4.6e-05	8.6e-04	5.6e-03	8.7e-03	5.1e-04	9.0e-06	1.7e-04	1.1e-03	1.7e-03
Am-242m	4.0e-03	7.1e-05	1.3e-03	8.7e-03	1.3e-02	7.8e-04	1.4e-05	2.6e-04	1.7e-03	2.6e-03
Am-243	5.3e-02	9.4e-04	1.8e-02	1.2e-01	1.8e-01	1.0e-02	1.8e-04	3.5e-03	2.3e-02	3.5e-02
Cm-242	8.6e-06	1.5e-07	2.9e-06	1.9e-05	2.9e-05	1.7e-06	3.0e-08	5.8e-07	3.8e-06	5.8e-06
Cm-243	3.4e-02	6.2e-04	1.1e-02	7.6e-02	1.1e-01	6.6e-03	1.2e-04	2.3e-03	1.5e-02	2.2e-02
Cm-244	7.2e-06	1.3e-07	2.5e-06	1.6e-05	2.5e-05	1.4e-06	2.6e-08	4.9e-07	3.2e-06	4.8e-06
Cm-245	2.0e-02	3.6e-04	6.7e-03	4.4e-02	6.7e-02	3.8e-03	7.1e-05	1.3e-03	8.7e-03	1.3e-02
Cm-246	6.7e-06	1.2e-07	2.3e-06	1.5e-05	2.3e-05	1.3e-06	2.4e-08	4.6e-07	3.0e-06	4.4e-06
Cm-247	1.1e-01	2.0e-03	3.7e-02	2.4e-01	3.6e-01	2.1e-02	3.9e-04	7.3e-03	4.8e-02	7.1e-02
Cm-248	5.1e-06	9.3e-08	1.7e-06	1.1e-05	1.7e-05	9.9e-07	1.8e-08	3.4e-07	2.2e-06	3.4e-06
Bk-249	1.8e-05	3.4e-07	5.8e-06	3.9e-05	6.5e-05	3.5e-06	6.7e-08	1.1e-06	7.6e-06	1.3e-05
Cf-248	6.8e-06	1.3e-07	2.3e-06	1.5e-05	2.3e-05	1.3e-06	2.4e-08	4.6e-07	2.9e-06	4.5e-06
Cf-249	1.1e-01	2.0e-03	3.7e-02	2.3e-01	3.6e-01	2.1e-02	3.9e-04	7.3e-03	4.6e-02	7.1e-02
Cf-250	6.8e-06	1.3e-07	2.3e-06	1.5e-05	2.3e-05	1.3e-06	2.5e-08	4.6e-07	3.0e-06	4.5e-06
Cf-251	3.0e-02	5.7e-04	1.0e-02	6.7e-02	1.0e-01	6.0e-03	1.1e-04	2.1e-03	1.3e-02	2.0e-02
Cf-252	9.9e-06	1.9e-07	3.4e-06	2.2e-05	3.4e-05	1.9e-06	3.6e-08	6.8e-07	4.3e-06	6.6e-06
Cf-254	1.6e-08	2.7e-10	5.3e-09	3.5e-08	5.3e-08	3.1e-09	5.3e-11	1.0e-09	6.9e-09	1.0e-08
Es-254	3.0e-01	5.5e-03	1.0e-01	6.5e-01	9.9e-01	5.8e-02	1.1e-03	2.0e-02	1.3e-01	2.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.50 Normalized effective dose equivalents from all pathways: Dust disposal-municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.5e-08	0.0e+00	7.5e-11	2.7e-08	6.4e-08	3.0e-09	0.0e+00	1.5e-11	5.5e-09	1.3e-08
Na-22	3.0e+00	2.2e-02	9.0e-01	7.8e+00	1.2e+01	5.9e-01	4.4e-03	1.8e-01	1.5e+00	2.3e+00
P-32	1.6e-05	6.1e-09	4.0e-06	3.2e-05	5.4e-05	3.2e-06	1.2e-09	8.0e-07	6.2e-06	1.1e-05
S-35	8.3e-08	6.8e-10	3.2e-08	1.8e-07	2.7e-07	1.7e-08	1.4e-10	6.4e-09	3.6e-08	5.5e-08
Cl-36	2.4e-04	9.9e-07	5.1e-05	8.1e-04	1.1e-03	4.7e-05	1.9e-07	1.0e-05	1.2e-04	2.1e-04
K-40	2.5e-01	1.7e-03	6.8e-02	8.5e-01	1.0e+00	5.0e-02	3.5e-04	1.3e-02	1.3e-01	2.1e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	7.3e-07	5.7e-09	2.9e-07	1.7e-06	2.5e-06	1.4e-07	1.2e-09	5.6e-08	3.4e-07	5.1e-07
Sc-46	1.1e-01	9.6e-04	4.7e-02	2.4e-01	3.6e-01	2.2e-02	1.9e-04	9.1e-03	4.8e-02	7.1e-02
Cr-51	1.8e-04	3.3e-07	5.3e-05	4.5e-04	6.5e-04	3.5e-05	6.5e-08	1.0e-05	8.8e-05	1.3e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	3.5e-02	4.0e-05	6.7e-03	1.2e-01	1.6e-01	7.0e-03	7.9e-06	1.3e-03	2.3e-02	3.2e-02
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	8.2e-03	2.9e-05	3.0e-03	1.8e-02	2.7e-02	1.6e-03	5.8e-06	5.9e-04	3.6e-03	5.4e-03
Co-58	3.7e-02	1.6e-04	1.4e-02	8.4e-02	1.2e-01	7.3e-03	3.2e-05	2.7e-03	1.7e-02	2.5e-02
Co-57	1.3e-03	4.2e-06	3.9e-04	3.7e-03	5.4e-03	2.6e-04	8.6e-07	7.7e-05	7.1e-04	1.0e-03
Co-58	8.8e-03	3.7e-05	3.3e-03	2.0e-02	3.0e-02	1.7e-03	7.5e-06	6.6e-04	3.9e-03	5.8e-03
Co-60	5.9e-02	1.5e-04	1.3e-02	1.7e-01	2.8e-01	1.2e-02	3.0e-05	2.7e-03	3.3e-02	5.5e-02
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	9.7e-01	7.3e-03	3.5e-01	2.4e+00	3.3e+00	1.9e-01	1.5e-03	6.8e-02	4.7e-01	6.7e-01
As-73	5.9e-04	5.4e-06	2.3e-04	1.2e-03	1.9e-03	1.2e-04	1.1e-06	4.6e-05	2.4e-04	3.7e-04
Se-75	2.1e-01	3.5e-04	3.7e-02	6.5e-01	9.1e-01	4.2e-02	7.0e-05	7.4e-03	1.3e-01	1.8e-01
Sr-85	2.3e-02	1.9e-04	9.4e-03	4.9e-02	7.3e-02	4.6e-03	3.9e-05	1.9e-03	9.6e-03	1.4e-02
Sr-89	8.1e-05	4.7e-07	2.5e-05	1.3e-04	1.9e-04	1.2e-05	9.4e-08	4.9e-06	2.5e-05	3.8e-05
Sr-90	4.9e-04	2.6e-06	1.2e-04	1.3e-03	2.2e-03	9.7e-05	5.0e-07	2.5e-05	2.6e-04	4.3e-04
Y-91	2.4e-04	2.1e-06	9.6e-05	5.0e-04	7.8e-04	4.8e-05	4.2e-07	1.9e-05	9.9e-05	1.6e-04
Zr-93	4.3e-08	5.9e-12	1.5e-09	6.5e-08	1.8e-07	8.5e-09	1.2e-12	3.1e-10	1.3e-08	3.6e-08
Zr-95	8.0e-02	4.8e-04	2.2e-02	1.4e-01	2.1e-01	1.2e-02	9.4e-05	4.4e-03	2.7e-02	4.1e-02
Nb-93m	2.0e-06	1.1e-08	5.3e-07	5.5e-06	9.0e-06	4.0e-07	2.2e-09	1.1e-07	1.1e-06	1.8e-06
Nb-94	1.9e-01	1.0e-03	5.0e-02	5.2e-01	8.6e-01	3.8e-02	2.1e-04	9.8e-03	1.0e-01	1.7e-01
Nb-95	2.5e-02	1.5e-04	9.2e-03	4.9e-02	7.9e-02	4.8e-03	2.9e-05	1.8e-03	9.5e-03	1.5e-02
Mo-93	2.3e-06	5.8e-09	4.9e-07	8.4e-06	1.1e-05	4.6e-07	1.2e-09	9.7e-08	1.3e-06	2.3e-06
Tc-97	3.2e-06	6.7e-09	6.6e-07	8.6e-06	1.5e-05	6.4e-07	1.7e-09	1.3e-07	1.8e-06	3.0e-06
Tc-97m	3.2e-06	1.5e-08	1.2e-06	7.3e-06	1.1e-05	6.3e-07	2.9e-09	2.3e-07	1.5e-06	2.1e-06
Tc-99	5.0e-07	1.3e-09	1.0e-07	1.4e-06	2.4e-06	9.9e-08	2.6e-10	2.1e-08	2.7e-07	4.7e-07
Ru-103	2.8e-03	9.3e-06	9.5e-04	5.8e-03	8.5e-03	5.5e-04	1.9e-06	1.9e-04	1.1e-03	1.7e-03
Ru-106	3.7e-03	1.1e-05	9.8e-04	1.0e-02	1.5e-02	7.4e-04	2.1e-06	2.0e-04	2.1e-03	3.0e-03
Ag-108m	3.4e-01	8.4e-05	1.8e-02	1.0e+00	1.9e+00	6.8e-02	1.6e-05	3.6e-03	2.0e-01	3.7e-01
Ag-110m	3.5e-01	1.3e-04	3.1e-02	1.2e+00	1.8e+00	6.9e-02	2.6e-05	6.1e-03	2.3e-01	3.5e-01
Cd-109	8.6e-03	5.5e-05	2.7e-03	2.3e-02	3.4e-02	1.7e-03	1.1e-05	5.3e-04	4.7e-03	6.7e-03
Sn-113	4.1e-03	3.7e-05	1.5e-03	8.5e-03	1.4e-02	8.0e-04	7.3e-06	3.0e-04	1.7e-03	2.7e-03
Sb-124	1.1e+00	6.5e-03	1.7e-01	2.3e+00	4.6e+00	2.3e-01	1.3e-03	3.3e-02	4.5e-01	9.2e-01
Sb-125	3.9e-01	1.8e-03	7.6e-02	7.8e-01	1.5e+00	7.7e-02	3.5e-04	1.5e-02	1.6e-01	2.9e-01
Te-123m	1.0e-01	6.8e-04	4.2e-02	2.5e-01	3.5e-01	2.0e-02	1.4e-04	8.5e-03	5.0e-02	7.0e-02
Te-127m	5.2e-03	3.5e-05	2.2e-03	1.2e-02	1.8e-02	1.0e-03	7.1e-06	4.4e-04	2.5e-03	3.5e-03
I-125	5.9e-04	4.1e-06	2.1e-04	1.3e-03	2.0e-03	1.2e-04	8.1e-07	4.1e-05	2.5e-04	4.0e-04
I-129	1.2e-03	5.4e-06	2.9e-04	3.4e-03	5.6e-03	2.5e-04	1.0e-06	5.6e-05	6.8e-04	1.1e-03
I-131	9.1e-03	2.2e-09	1.6e-03	2.0e-02	3.2e-02	1.8e-03	4.6e-10	3.1e-04	4.0e-03	6.4e-03
Cs-134	3.0e+00	1.5e-02	8.4e-01	8.6e+00	1.3e+01	5.9e-01	3.1e-03	1.7e-01	1.7e+00	2.5e+00
Cs-135	1.4e-05	6.4e-08	3.5e-06	3.9e-05	6.4e-05	2.8e-06	1.3e-08	6.9e-07	7.8e-06	1.2e-05
Cs-137	1.2e+00	5.7e-03	3.1e-01	3.5e+00	5.6e+00	2.5e-01	1.1e-03	6.1e-02	6.9e-01	1.1e+00
Ba-133	3.9e-02	2.1e-04	9.9e-03	1.1e-01	1.7e-01	7.6e-03	4.1e-05	1.9e-03	2.1e-02	3.3e-02
Ce-139	7.1e-03	5.5e-05	2.8e-03	1.6e-02	2.4e-02	1.4e-03	1.1e-05	5.5e-04	3.2e-03	4.9e-03
Ce-141	1.6e-03	7.9e-06	5.9e-04	3.1e-03	4.9e-03	3.1e-04	1.6e-06	1.2e-04	6.0e-04	9.9e-04
Ce-144	4.5e-03	3.1e-05	1.5e-03	1.2e-02	1.7e-02	9.0e-04	6.1e-06	3.0e-04	2.3e-03	3.4e-03
Pm-147	8.9e-07	5.4e-09	2.5e-07	2.4e-06	3.8e-06	1.8e-07	1.1e-09	5.0e-08	4.9e-07	7.6e-07

Table F1.50 Normalized effective dose equivalents from all pathways: Dust disposal-municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-08	1.0e-10	4.9e-09	5.5e-08	8.9e-08	4.0e-09	2.0e-11	9.7e-10	1.1e-08	1.8e-08
Eu-152	1.4e-01	7.3e-04	3.5e-02	3.7e-01	6.0e-01	2.7e-02	1.5e-04	7.0e-03	7.3e-02	1.2e-01
Eu-154	1.5e-01	8.0e-04	3.9e-02	4.0e-01	6.5e-01	3.0e-02	1.6e-04	7.6e-03	7.9e-02	1.3e-01
Eu-155	3.4e-03	1.9e-05	9.2e-04	9.3e-03	1.5e-02	6.8e-04	3.8e-06	1.8e-04	1.8e-03	3.0e-03
Gd-153	3.3e-03	2.3e-05	1.2e-03	8.3e-03	1.2e-02	6.6e-04	4.6e-06	2.3e-04	1.6e-03	2.3e-03
Tb-160	5.8e-02	5.0e-04	2.3e-02	1.2e-01	1.8e-01	1.1e-02	1.0e-04	4.6e-03	2.4e-02	3.7e-02
Tm-170	1.6e-04	1.3e-06	6.3e-05	3.7e-04	5.4e-04	3.2e-05	2.6e-07	1.2e-05	7.3e-05	1.1e-04
Tm-171	1.9e-05	1.1e-07	5.5e-06	5.3e-05	8.4e-05	3.8e-06	2.2e-08	1.1e-06	1.0e-05	1.6e-05
Ta-182	8.2e-02	6.6e-04	3.3e-02	1.9e-01	2.7e-01	1.6e-02	1.3e-04	6.5e-03	3.7e-02	5.3e-02
W-181	1.5e-04	5.4e-07	5.2e-05	3.6e-04	5.3e-04	2.9e-05	1.1e-07	1.0e-05	7.2e-05	1.0e-04
W-185	6.6e-07	2.6e-09	2.4e-07	1.5e-06	2.2e-06	1.3e-07	5.3e-10	4.8e-08	3.0e-07	4.4e-07
Os-185	7.7e-01	6.9e-03	3.2e-01	1.7e+00	2.4e+00	1.5e-01	1.4e-03	6.4e-02	3.3e-01	4.8e-01
Ir-192	7.1e-03	3.4e-05	2.7e-03	1.6e-02	2.3e-02	1.4e-03	6.7e-06	5.3e-04	3.1e-03	4.5e-03
Tl-204	1.5e-03	8.3e-06	4.0e-04	4.0e-03	6.2e-03	2.9e-04	1.7e-06	8.0e-05	7.9e-04	1.2e-03
Pb-210	2.4e-03	1.3e-05	6.2e-04	6.4e-03	1.0e-02	4.7e-04	2.6e-06	1.2e-04	1.3e-03	2.0e-03
Bi-207	3.7e+00	2.0e-02	9.6e-01	9.9e+00	1.6e+01	7.2e-01	4.1e-03	1.9e-01	2.0e+00	3.1e+00
Po-210	1.2e-05	9.7e-08	4.7e-06	2.6e-05	3.8e-05	2.3e-06	1.9e-08	9.2e-07	5.1e-06	7.5e-06
Ra-226	2.2e-01	1.2e-03	5.7e-02	5.9e-01	9.9e-01	4.4e-02	2.4e-04	1.1e-02	1.2e-01	2.0e-01
Ra-228	1.4e-01	6.7e-04	3.1e-02	3.7e-01	6.6e-01	2.8e-02	1.3e-04	6.3e-03	7.3e-02	1.3e-01
Ac-227	3.9e-02	2.2e-04	1.0e-02	1.0e-01	1.7e-01	7.8e-03	4.4e-05	2.0e-03	2.1e-02	3.5e-02
Th-228	1.7e-01	1.1e-03	5.1e-02	4.7e-01	7.2e-01	3.4e-02	2.1e-04	1.0e-02	9.5e-02	1.4e-01
Th-229	3.2e-02	1.7e-04	8.1e-03	8.5e-02	1.4e-01	6.8e-03	3.4e-05	1.6e-03	1.7e-02	2.8e-02
Th-230	7.3e-05	1.8e-07	8.1e-06	1.5e-04	3.4e-04	1.4e-05	3.6e-08	1.6e-06	2.9e-05	6.6e-05
Th-232	8.7e-03	1.2e-06	2.7e-04	1.2e-02	3.7e-02	1.7e-03	2.3e-07	5.4e-05	2.4e-03	7.4e-03
Pa-231	4.5e-03	2.0e-05	1.0e-03	1.2e-02	2.0e-02	8.8e-04	4.0e-06	2.0e-04	2.3e-03	3.9e-03
U-232	3.1e-02	5.3e-06	1.4e-03	5.5e-02	1.4e-01	6.1e-03	1.1e-06	2.7e-04	1.1e-02	2.8e-02
U-233	3.0e-05	1.5e-07	7.3e-06	7.6e-05	1.3e-04	5.9e-06	3.1e-08	1.4e-06	1.6e-05	2.6e-05
U-234	8.1e-06	4.3e-08	2.1e-06	2.2e-05	3.6e-05	1.6e-06	8.8e-09	4.1e-07	4.3e-06	7.0e-06
U-235	1.5e-02	8.2e-05	3.9e-03	4.1e-02	6.7e-02	3.0e-03	1.7e-05	7.8e-04	8.1e-03	1.3e-02
U-236	4.3e-06	2.3e-08	1.1e-06	1.2e-05	1.9e-05	8.5e-07	4.7e-09	2.2e-07	2.3e-06	3.8e-06
U-238	2.7e-03	1.4e-05	6.9e-04	7.1e-03	1.2e-02	5.3e-04	2.9e-06	1.4e-04	1.4e-03	2.3e-03
Np-237	2.2e-02	1.2e-04	5.7e-03	5.9e-02	9.5e-02	4.3e-03	2.2e-05	1.1e-03	1.2e-02	1.9e-02
Pu-236	1.6e-04	4.3e-08	1.8e-06	9.6e-05	4.4e-04	3.2e-05	8.6e-09	3.5e-07	1.9e-05	8.8e-05
Pu-238	3.0e-06	1.6e-08	7.6e-07	7.9e-06	1.3e-05	6.0e-07	3.2e-09	1.5e-07	1.6e-06	2.6e-06
Pu-239	5.9e-06	3.2e-08	1.5e-06	1.6e-05	2.6e-05	1.2e-06	6.3e-09	2.9e-07	3.0e-06	5.1e-06
Pu-240	2.9e-06	1.6e-08	7.3e-07	7.7e-06	1.3e-05	5.8e-07	3.1e-09	1.5e-07	1.5e-06	2.6e-06
Pu-241	8.0e-07	1.3e-09	5.5e-08	1.4e-06	3.6e-06	1.6e-07	2.6e-10	1.1e-08	2.8e-07	7.2e-07
Pu-242	2.6e-06	1.4e-08	6.4e-07	6.7e-06	1.1e-05	5.1e-07	2.7e-09	1.3e-07	1.3e-06	2.2e-06
Pu-244	4.1e-02	2.2e-04	1.0e-02	1.1e-01	1.8e-01	8.1e-03	4.3e-05	2.0e-03	2.1e-02	3.5e-02
Am-241	8.9e-04	4.7e-06	2.2e-04	2.4e-03	3.9e-03	1.8e-04	9.5e-07	4.4e-05	4.8e-04	7.8e-04
Am-242m	1.4e-03	7.3e-06	3.4e-04	3.7e-03	6.0e-03	2.7e-04	1.5e-06	6.7e-05	7.3e-04	1.2e-03
Am-243	1.8e-02	9.7e-05	4.6e-03	4.9e-02	7.9e-02	3.6e-03	1.9e-05	8.9e-04	9.8e-03	1.6e-02
Cm-242	2.0e-06	1.5e-08	7.8e-07	4.8e-06	7.1e-06	4.0e-07	3.0e-09	1.5e-07	9.6e-07	1.4e-06
Cm-243	1.2e-02	6.1e-05	3.0e-03	3.2e-02	5.2e-02	2.3e-03	1.2e-05	5.9e-04	6.2e-03	1.0e-02
Cm-244	2.5e-06	1.3e-08	6.5e-07	6.8e-06	1.1e-05	4.9e-07	2.6e-09	1.3e-07	1.3e-06	2.2e-06
Cm-245	6.9e-03	3.5e-05	1.8e-03	1.9e-02	3.1e-02	1.4e-03	7.0e-06	3.4e-04	3.7e-03	6.1e-03
Cm-246	2.3e-06	1.2e-08	6.0e-07	6.3e-06	1.1e-05	4.7e-07	2.4e-09	1.2e-07	1.3e-06	2.1e-06
Cm-247	3.8e-02	1.9e-04	9.7e-03	1.0e-01	1.7e-01	7.4e-03	3.8e-05	1.9e-03	2.0e-02	3.3e-02
Cm-248	1.8e-06	9.2e-09	4.6e-07	4.8e-06	7.9e-06	3.5e-07	1.8e-09	8.9e-08	9.5e-07	1.6e-06
Bk-249	2.5e-05	6.7e-09	1.3e-06	5.1e-05	1.2e-04	5.0e-06	1.3e-09	2.6e-07	1.0e-05	2.5e-05
Cf-248	1.9e-06	1.2e-08	6.1e-07	5.0e-06	7.2e-06	3.7e-07	2.3e-09	1.2e-07	9.9e-07	1.4e-06
Cf-249	3.7e-02	1.9e-04	9.6e-03	9.9e-02	1.6e-01	7.4e-03	3.8e-05	1.9e-03	2.0e-02	3.2e-02
Cf-250	2.3e-06	1.2e-08	6.1e-07	6.2e-06	1.0e-05	4.6e-07	2.4e-09	1.2e-07	1.2e-06	2.0e-06
Cf-251	1.1e-02	5.4e-05	2.7e-03	2.8e-02	4.6e-02	2.1e-03	1.1e-05	5.4e-04	5.6e-03	9.1e-03
Cf-252	3.1e-06	1.7e-08	8.9e-07	8.5e-06	1.3e-05	6.2e-07	3.5e-09	1.7e-07	1.7e-06	2.6e-06
Cf-254	2.9e-09	2.4e-11	1.2e-09	6.2e-09	9.2e-09	5.7e-10	4.7e-12	2.3e-10	1.2e-09	1.8e-09
Es-254	7.8e-02	5.2e-04	2.6e-02	2.0e-01	2.8e-01	1.5e-02	1.1e-04	5.2e-03	3.9e-02	5.6e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.51 Normalized effective dose equivalents from all pathways: Slag disposal–industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	4.6e+00	4.1e-01	2.4e+00	1.0e+01	1.5e+01	9.1e-01	8.0e-02	4.7e-01	2.0e+00	3.0e+00
P-32	1.9e-03	9.9e-05	7.1e-04	4.2e-03	6.9e-03	3.8e-04	2.0e-05	1.4e-04	8.4e-04	1.3e-03
S-35	1.2e-04	1.1e-05	5.7e-05	2.6e-04	4.2e-04	2.4e-05	2.3e-06	1.1e-05	5.2e-05	8.3e-05
Cl-36	8.3e-04	5.3e-05	3.4e-04	1.8e-03	2.9e-03	1.6e-04	1.1e-05	6.7e-05	3.6e-04	5.7e-04
K-40	3.7e-01	3.4e-02	1.9e-01	8.1e-01	1.2e+00	7.3e-02	6.7e-03	3.7e-02	1.6e-01	2.4e-01
Ca-41	2.4e-04	1.5e-05	1.0e-04	5.2e-04	8.2e-04	4.7e-05	3.1e-06	2.0e-05	1.0e-04	1.6e-04
Ca-45	8.8e-04	5.5e-05	3.1e-04	1.4e-03	2.3e-03	1.3e-04	1.1e-05	6.0e-05	2.8e-04	4.6e-04
Sc-46	7.9e+00	8.2e-01	3.7e+00	1.6e+01	2.6e+01	1.5e+00	1.7e-01	7.3e-01	3.2e+00	5.2e+00
Cr-51	1.3e-02	0.0e+00	4.9e-03	3.4e-02	5.3e-02	2.6e-03	0.0e+00	9.6e-04	6.7e-03	1.0e-02
Mn-53	2.1e-05	1.8e-07	8.5e-06	5.4e-05	7.6e-05	4.1e-06	3.5e-08	1.7e-06	1.1e-05	1.5e-05
Mn-54	2.2e+00	2.0e-02	9.1e-01	5.5e+00	7.7e+00	4.4e-01	3.9e-03	1.8e-01	1.1e+00	1.5e+00
Fe-55	2.3e-06	0.0e+00	8.4e-07	8.1e-06	9.2e-06	4.6e-07	0.0e+00	1.7e-07	1.2e-06	1.8e-06
Fe-59	6.0e-02	0.0e+00	2.3e-02	1.6e-01	2.3e-01	1.2e-02	0.0e+00	4.6e-03	3.1e-02	4.6e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.7e+00	1.7e-01	7.9e-01	3.5e+00	5.7e+00	3.3e-01	3.5e-02	1.6e-01	7.0e-01	1.1e+00
Sr-89	5.7e-03	5.6e-04	2.6e-03	1.2e-02	1.9e-02	1.1e-03	1.1e-04	5.2e-04	2.4e-03	3.7e-03
Sr-90	5.3e-02	5.1e-03	2.5e-02	1.1e-01	1.8e-01	1.0e-02	1.0e-03	4.8e-03	2.2e-02	3.5e-02
Y-91	2.0e-02	2.1e-03	9.4e-03	4.2e-02	6.6e-02	4.0e-03	4.2e-04	1.9e-03	8.3e-03	1.3e-02
Zr-93	3.8e-03	3.7e-04	1.7e-03	8.2e-03	1.3e-02	7.6e-04	7.4e-05	3.4e-04	1.6e-03	2.6e-03
Zr-95	4.1e+00	4.4e-01	1.9e+00	8.4e+00	1.4e+01	8.0e-01	8.9e-02	3.8e-01	1.6e+00	2.7e+00
Nb-93m	1.4e-03	1.4e-04	6.5e-04	3.0e-03	4.8e-03	2.8e-04	2.8e-05	1.3e-04	5.9e-04	9.6e-04
Nb-94	8.0e+00	8.7e-01	3.8e+00	1.6e+01	2.7e+01	1.6e+00	1.8e-01	7.4e-01	3.2e+00	5.4e+00
Nb-95	2.0e+00	1.8e-01	9.1e-01	4.2e+00	6.5e+00	3.9e-01	3.6e-02	1.8e-01	8.4e-01	1.3e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.2e-01	0.0e+00	4.5e-02	3.1e-01	4.7e-01	2.3e-02	0.0e+00	9.0e-03	6.1e-02	9.1e-02
Sb-125	3.6e-02	0.0e+00	1.4e-02	9.6e-02	1.4e-01	7.2e-03	0.0e+00	2.7e-03	1.9e-02	2.8e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.4e-03	2.0e-04	1.3e-03	7.2e-03	1.2e-02	6.6e-04	4.0e-05	2.7e-04	1.4e-03	2.3e-03
I-129	1.4e-02	7.0e-04	5.5e-03	3.2e-02	5.1e-02	2.8e-03	1.4e-04	1.1e-03	6.2e-03	1.0e-02
I-131	3.8e-02	5.5e-04	9.0e-03	8.4e-02	1.5e-01	7.4e-03	1.1e-04	1.8e-03	1.6e-02	3.0e-02
Cs-134	8.6e-01	1.5e-02	1.1e-01	1.4e+00	3.4e+00	1.7e-01	3.1e-03	2.2e-02	2.7e-01	6.5e-01
Cs-135	1.4e-04	1.6e-06	1.7e-05	2.1e-04	5.4e-04	2.8e-05	3.3e-07	3.3e-06	4.1e-05	1.1e-04
Cs-137	3.2e-01	5.7e-03	4.2e-02	5.1e-01	1.3e+00	6.3e-02	1.1e-03	8.2e-03	1.0e-01	2.5e-01
Ba-133	1.6e+00	1.8e-01	7.6e-01	3.3e+00	5.5e+00	3.2e-01	3.6e-02	1.5e-01	6.5e-01	1.1e+00
Ce-139	4.4e-01	4.7e-02	2.1e-01	9.1e-01	1.5e+00	8.7e-02	9.5e-03	4.1e-02	1.8e-01	3.0e-01
Ce-141	1.3e-01	1.1e-02	5.9e-02	2.7e-01	4.2e-01	2.5e-02	2.3e-03	1.2e-02	5.4e-02	8.2e-02
Ce-144	2.6e-01	2.8e-02	1.2e-01	5.3e-01	8.8e-01	5.1e-02	5.7e-03	2.4e-02	1.1e-01	1.7e-01
Pm-147	1.8e-03	1.8e-04	8.4e-04	3.9e-03	6.2e-03	3.6e-04	3.6e-05	1.7e-04	7.7e-04	1.2e-03

Table F1.51 Normalized effective dose equivalents from all pathways: Slag disposal–Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.4e-03	1.3e-04	6.1e-04	2.9e-03	4.6e-03	2.7e-04	2.6e-05	1.2e-04	5.7e-04	9.1e-04
Eu-152	5.8e+00	6.2e-01	2.7e+00	1.2e+01	2.0e+01	1.1e+00	1.3e-01	5.3e-01	2.8e+00	3.9e+00
Eu-154	6.3e+00	6.8e-01	3.0e+00	1.3e+01	2.1e+01	1.2e+00	1.4e-01	5.8e-01	2.5e+00	4.2e+00
Eu-155	1.5e-01	1.6e-02	7.1e-02	3.1e-01	5.1e-01	3.0e-02	3.3e-03	1.4e-02	6.1e-02	1.0e-01
Gd-153	1.8e-01	2.0e-02	8.6e-02	3.8e-01	6.2e-01	3.6e-02	4.0e-03	1.7e-02	7.4e-02	1.2e-01
Tb-160	4.1e+00	4.2e-01	1.9e+00	8.5e+00	1.4e+01	8.0e-01	8.5e-02	3.8e-01	1.7e+00	2.7e+00
Tm-170	1.2e-02	1.3e-03	5.5e-03	2.4e-02	4.0e-02	2.3e-03	2.6e-04	1.1e-03	4.8e-03	7.8e-03
Tm-171	1.3e-03	1.5e-04	6.2e-04	2.7e-03	4.5e-03	2.6e-04	3.0e-05	1.2e-04	5.3e-04	8.8e-04
Ta-182	5.3e+00	5.6e-01	2.5e+00	1.1e+01	1.8e+01	1.0e+00	1.1e-01	4.9e-01	2.2e+00	3.5e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	9.8e+00	1.1e+00	4.6e+00	2.0e+01	3.3e+01	1.9e+00	2.2e-01	9.1e-01	3.9e+00	6.6e+00
Ra-228	6.1e+00	6.7e-01	2.8e+00	1.2e+01	2.1e+01	1.2e+00	1.4e-01	5.6e-01	2.4e+00	4.1e+00
Ac-227	6.0e+01	5.8e+00	2.8e+01	1.3e+02	2.1e+02	1.2e+01	1.2e+00	5.4e+00	2.5e+01	4.1e+01
Th-228	2.3e+01	2.4e+00	1.0e+01	4.8e+01	7.6e+01	4.5e+00	4.8e-01	2.1e+00	9.3e+00	1.5e+01
Th-229	7.7e+01	7.3e+00	3.5e+01	1.6e+02	2.6e+02	1.5e+01	1.5e+00	6.9e+00	3.3e+01	5.2e+01
Th-230	1.1e+01	1.1e+00	5.1e+00	2.4e+01	3.9e+01	2.2e+00	2.1e-01	1.0e+00	4.8e+00	7.7e+00
Th-232	5.0e+01	4.7e+00	2.3e+01	1.1e+02	1.7e+02	9.9e+00	9.5e-01	4.5e+00	2.1e+01	3.4e+01
Pa-231	3.9e+01	3.7e+00	1.8e+01	8.3e+01	1.3e+02	7.7e+00	7.5e-01	3.5e+00	1.6e+01	2.6e+01
U-232	2.9e+01	2.7e+00	1.3e+01	6.2e+01	9.9e+01	5.8e+00	5.6e-01	2.6e+00	1.2e+01	2.0e+01
U-233	5.9e+00	5.5e-01	2.6e+00	1.2e+01	2.0e+01	1.2e+00	1.1e-01	5.2e-01	2.5e+00	4.0e+00
U-234	5.7e+00	5.4e-01	2.6e+00	1.2e+01	2.0e+01	1.1e+00	1.1e-01	5.1e-01	2.4e+00	3.9e+00
U-235	5.9e+00	5.8e-01	2.7e+00	1.3e+01	2.0e+01	1.2e+00	1.2e-01	5.4e-01	2.5e+00	4.0e+00
U-236	5.4e+00	5.1e-01	2.4e+00	1.2e+01	1.9e+01	1.1e+00	1.0e-01	4.9e-01	2.3e+00	3.7e+00
U-238	5.2e+00	4.9e-01	2.4e+00	1.1e+01	1.8e+01	1.0e+00	9.9e-02	4.7e-01	2.2e+00	3.5e+00
Np-237	2.5e+01	2.4e+00	1.1e+01	5.3e+01	8.5e+01	4.9e+00	4.8e-01	2.2e+00	1.0e+01	1.7e+01
Pu-236	5.7e+00	5.3e-01	2.6e+00	1.2e+01	1.9e+01	1.1e+00	1.1e-01	5.1e-01	2.4e+00	3.8e+00
Pu-238	1.3e+01	1.2e+00	5.8e+00	2.7e+01	4.4e+01	2.5e+00	2.5e-01	1.2e+00	5.4e+00	8.7e+00
Pu-239	1.4e+01	1.3e+00	6.3e+00	2.9e+01	4.7e+01	2.7e+00	2.6e-01	1.2e+00	5.8e+00	9.3e+00
Pu-240	1.4e+01	1.3e+00	6.3e+00	2.9e+01	4.7e+01	2.7e+00	2.6e-01	1.2e+00	5.8e+00	9.3e+00
Pu-241	2.3e-01	2.1e-02	1.0e-01	4.8e-01	7.7e-01	4.5e-02	4.3e-03	2.0e-02	9.5e-02	1.5e-01
Pu-242	1.3e+01	1.2e+00	6.0e+00	2.8e+01	4.5e+01	2.6e+00	2.5e-01	1.2e+00	5.5e+00	8.9e+00
Pu-244	1.5e+01	1.5e+00	6.7e+00	3.1e+01	4.9e+01	2.9e+00	2.9e-01	1.3e+00	6.1e+00	9.8e+00
Am-241	2.0e+01	1.9e+00	9.0e+00	4.2e+01	6.7e+01	3.9e+00	3.8e-01	1.8e+00	8.3e+00	1.3e+01
Am-242m	2.0e+01	1.9e+00	8.9e+00	4.2e+01	6.7e+01	3.9e+00	3.7e-01	1.8e+00	8.2e+00	1.3e+01
Am-243	2.0e+01	1.9e+00	9.2e+00	4.3e+01	6.9e+01	4.0e+00	3.9e-01	1.8e+00	8.5e+00	1.4e+01
Cm-242	6.6e-01	6.3e-02	3.0e-01	1.4e+00	2.3e+00	1.3e-01	1.3e-02	6.0e-02	2.8e-01	4.5e-01
Cm-243	1.4e+01	1.3e+00	6.4e+00	3.0e+01	4.8e+01	2.8e+00	2.7e-01	1.3e+00	5.9e+00	9.5e+00
Cm-244	1.1e+01	1.0e+00	5.0e+00	2.3e+01	3.8e+01	2.2e+00	2.1e-01	9.8e-01	4.6e+00	7.4e+00
Cm-245	2.0e+01	1.9e+00	9.3e+00	4.4e+01	7.0e+01	4.0e+00	3.9e-01	1.8e+00	8.6e+00	1.4e+01
Cm-246	2.0e+01	1.9e+00	9.1e+00	4.3e+01	6.9e+01	3.9e+00	3.8e-01	1.8e+00	8.4e+00	1.4e+01
Cm-247	2.0e+01	1.9e+00	9.1e+00	4.2e+01	6.8e+01	3.9e+00	3.9e-01	1.8e+00	8.3e+00	1.3e+01
Cm-248	7.3e+01	6.9e+00	3.3e+01	1.6e+02	2.5e+02	1.4e+01	1.4e+00	6.6e+00	3.1e+01	5.0e+01
Bk-249	6.1e-02	5.7e-03	2.7e-02	1.3e-01	2.1e-01	1.2e-02	1.2e-03	5.4e-03	2.5e-02	4.1e-02
Cf-248	2.1e+00	2.0e-01	9.6e-01	4.5e+00	7.3e+00	4.2e-01	4.0e-02	1.9e-01	8.9e-01	1.4e+00
Cf-249	1.9e+01	1.8e+00	8.5e+00	4.0e+01	6.3e+01	3.7e+00	3.7e-01	1.7e+00	7.8e+00	1.3e+01
Cf-250	9.2e+00	8.7e-01	4.1e+00	2.0e+01	3.1e+01	1.8e+00	1.7e-01	8.2e-01	3.9e+00	6.1e+00
Cf-251	1.8e+01	1.7e+00	8.1e+00	3.8e+01	6.1e+01	3.5e+00	3.5e-01	1.6e+00	7.5e+00	1.2e+01
Cf-252	6.8e+00	6.3e-01	3.1e+00	1.4e+01	2.3e+01	1.3e+00	1.3e-01	6.1e-01	2.8e+00	4.5e+00
Cf-254	8.7e+00	7.9e-01	3.9e+00	1.9e+01	3.0e+01	1.7e+00	1.6e-01	7.8e-01	3.7e+00	5.9e+00
Es-254	5.9e+00	5.5e-01	2.8e+00	1.2e+01	2.0e+01	1.2e+00	1.3e-01	5.4e-01	2.4e+00	3.9e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.52 Normalized effective dose equivalents from external exposure: Slag disposal–industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	4.6e+00	4.1e-01	2.4e+00	1.0e+01	1.5e+01	9.1e-01	8.0e-02	4.7e-01	2.0e+00	3.0e+00
P-32	1.7e-03	8.6e-05	8.2e-04	3.7e-03	8.0e-03	3.3e-04	1.7e-05	1.2e-04	7.3e-04	1.2e-03
S-35	8.4e-06	8.7e-07	3.9e-06	1.7e-05	2.8e-05	1.6e-06	1.6e-07	7.6e-07	3.4e-06	5.6e-06
Cl-36	4.9e-04	3.1e-05	2.0e-04	1.1e-03	1.7e-03	9.6e-05	6.1e-06	3.9e-05	2.1e-04	3.3e-04
K-40	3.7e-01	3.4e-02	1.9e-01	8.1e-01	1.2e+00	7.2e-02	6.7e-03	3.7e-02	1.6e-01	2.4e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	4.5e-05	4.7e-06	2.1e-05	9.2e-05	1.5e-04	8.8e-06	9.6e-07	4.1e-06	1.8e-05	3.0e-05
Sc-46	7.9e+00	8.2e-01	3.7e+00	1.6e+01	2.6e+01	1.5e+00	1.7e-01	7.3e-01	3.2e+00	5.2e+00
Cr-51	1.3e-02	0.0e+00	4.9e-03	3.4e-02	5.3e-02	2.6e-03	0.0e+00	9.6e-04	6.7e-03	1.0e-02
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.2e+00	2.0e-02	9.1e-01	5.5e+00	7.7e+00	4.4e-01	3.9e-03	1.8e-01	1.1e+00	1.5e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	6.0e-02	0.0e+00	2.3e-02	1.6e-01	2.3e-01	1.2e-02	0.0e+00	4.6e-03	3.1e-02	4.6e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.7e+00	1.7e-01	7.9e-01	3.5e+00	5.7e+00	3.3e-01	3.5e-02	1.6e-01	7.0e-01	1.1e+00
Sr-89	4.7e-03	4.7e-04	2.2e-03	9.8e-03	1.5e-02	9.2e-04	9.3e-05	4.3e-04	1.9e-03	3.0e-03
Sr-90	2.0e-02	2.2e-03	9.5e-03	4.1e-02	6.9e-02	4.0e-03	4.5e-04	1.9e-03	8.2e-03	1.4e-02
Y-91	1.8e-02	1.8e-03	8.4e-03	3.7e-02	5.9e-02	3.5e-03	3.6e-04	1.7e-03	7.4e-03	1.2e-02
Zr-93	3.5e-07	2.5e-08	1.4e-07	7.4e-07	1.2e-06	6.8e-08	4.9e-09	2.9e-08	1.5e-07	2.4e-07
Zr-95	4.1e+00	4.4e-01	1.9e+00	8.4e+00	1.4e+01	8.0e-01	8.9e-02	3.8e-01	1.6e+00	2.7e+00
Nb-93m	8.6e-05	9.3e-06	4.0e-05	1.7e-04	2.9e-04	1.7e-05	1.9e-06	7.9e-06	3.4e-05	5.7e-05
Nb-94	8.0e+00	8.6e-01	3.8e+00	1.6e+01	2.7e+01	1.6e+00	1.8e-01	7.4e-01	3.2e+00	5.4e+00
Nb-95	2.0e+00	1.8e-01	9.1e-01	4.2e+00	6.5e+00	3.9e-01	3.6e-02	1.8e-01	8.4e-01	1.3e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.2e-01	0.0e+00	4.5e-02	3.1e-01	4.6e-01	2.3e-02	0.0e+00	9.0e-03	6.1e-02	9.1e-02
Sb-125	3.6e-02	0.0e+00	1.4e-02	9.6e-02	1.4e-01	7.2e-03	0.0e+00	2.7e-03	1.9e-02	2.8e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	2.3e-03	1.4e-04	9.2e-04	4.9e-03	7.7e-03	4.5e-04	2.8e-05	1.8e-04	9.7e-04	1.5e-03
I-129	2.7e-03	1.7e-04	1.1e-03	5.8e-03	8.9e-03	5.2e-04	3.3e-05	2.1e-04	1.2e-03	1.7e-03
I-131	3.8e-02	5.5e-04	9.0e-03	8.3e-02	1.5e-01	7.4e-03	1.1e-04	1.8e-03	1.6e-02	2.9e-02
Cs-134	8.6e-01	1.5e-02	1.1e-01	1.4e+00	3.4e+00	1.7e-01	3.1e-03	2.2e-02	2.7e-01	6.6e-01
Cs-135	3.6e-06	6.4e-08	4.7e-07	5.7e-06	1.4e-05	7.0e-07	1.3e-08	9.2e-08	1.1e-06	2.8e-06
Cs-137	3.2e-01	5.7e-03	4.1e-02	5.1e-01	1.3e+00	6.3e-02	1.1e-03	8.2e-03	1.0e-01	2.5e-01
Ba-133	1.6e+00	1.8e-01	7.6e-01	3.3e+00	5.5e+00	3.2e-01	3.6e-02	1.5e-01	6.5e-01	1.1e+00
Ce-139	4.4e-01	4.7e-02	2.1e-01	9.1e-01	1.5e+00	8.7e-02	9.5e-03	4.1e-02	1.8e-01	2.9e-01
Ce-141	1.3e-01	1.1e-02	5.8e-02	2.7e-01	4.2e-01	2.5e-02	2.3e-03	1.2e-02	5.4e-02	8.2e-02
Ce-144	2.4e-01	2.6e-02	1.1e-01	5.0e-01	8.2e-01	4.8e-02	5.3e-03	2.2e-02	9.8e-02	1.6e-01
Pm-147	4.0e-05	4.3e-06	1.9e-05	8.3e-05	1.4e-04	8.0e-06	8.8e-07	3.7e-06	1.6e-05	2.7e-05

Table F1.52 Normalized effective dose equivalents from external exposure: Slag disposal–Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	6.2e-07	8.8e-08	3.8e-07	1.7e-06	2.8e-06	1.6e-07	1.8e-08	7.5e-08	3.3e-07	5.4e-07
Eu-152	5.8e+00	6.2e-01	2.7e+00	1.2e+01	2.0e+01	1.1e+00	1.3e-01	5.3e-01	2.3e+00	3.9e+00
Eu-154	6.3e+00	6.8e-01	3.0e+00	1.3e+01	2.1e+01	1.2e+00	1.4e-01	5.8e-01	2.5e+00	4.2e+00
Eu-155	1.5e-01	1.6e-02	7.0e-02	3.0e-01	5.0e-01	2.9e-02	3.3e-03	1.4e-02	6.0e-02	1.0e-01
Gd-153	1.8e-01	2.0e-02	8.6e-02	3.7e-01	6.1e-01	3.6e-02	4.0e-03	1.7e-02	7.4e-02	1.2e-01
Tb-160	4.1e+00	4.2e-01	1.9e+00	8.5e+00	1.4e+01	8.0e-01	8.5e-02	3.8e-01	1.7e+00	2.7e+00
Tm-170	1.0e-02	1.1e-03	4.8e-03	2.1e-02	3.5e-02	2.0e-03	2.2e-04	9.5e-04	4.1e-03	6.8e-03
Tm-171	8.9e-04	9.6e-05	4.2e-04	1.8e-03	3.0e-03	1.8e-04	2.0e-05	8.3e-05	3.6e-04	6.0e-04
Ta-182	5.3e+00	5.6e-01	2.5e+00	1.1e+01	1.8e+01	1.0e+00	1.1e-01	4.9e-01	2.2e+00	3.5e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	9.3e+00	1.0e+00	4.3e+00	1.9e+01	3.1e+01	1.8e+00	2.0e-01	8.6e-01	3.7e+00	6.2e+00
Ra-228	5.2e+00	5.6e-01	2.4e+00	1.1e+01	1.8e+01	1.0e+00	1.1e-01	4.8e-01	2.1e+00	3.5e+00
Ac-227	1.7e+00	1.8e-01	7.8e-01	3.4e+00	5.6e+00	3.3e-01	3.6e-02	1.5e-01	6.6e-01	1.1e+00
Th-228	8.2e+00	8.7e-01	3.8e+00	1.7e+01	2.8e+01	1.6e+00	1.8e-01	7.5e-01	3.3e+00	5.5e+00
Th-229	1.3e+00	1.4e-01	6.2e-01	2.7e+00	4.5e+00	2.6e-01	2.9e-02	1.2e-01	5.3e-01	8.8e-01
Th-230	1.4e-03	1.5e-04	6.5e-04	2.9e-03	4.7e-03	2.8e-04	3.0e-05	1.3e-04	5.6e-04	9.3e-04
Th-232	6.1e-02	4.3e-03	2.5e-02	1.3e-01	2.1e-01	1.2e-02	8.6e-04	5.0e-03	2.6e-02	4.2e-02
Pa-231	1.6e-01	1.8e-02	7.6e-02	3.3e-01	5.5e-01	3.2e-02	3.6e-03	1.5e-02	6.5e-02	1.1e-01
U-232	3.0e-01	2.1e-02	1.2e-01	6.3e-01	1.0e+00	5.8e-02	4.3e-03	2.5e-02	1.3e-01	2.0e-01
U-233	1.2e-03	1.3e-04	5.5e-04	2.4e-03	4.0e-03	2.3e-04	2.6e-05	1.1e-04	4.7e-04	7.8e-04
U-234	3.3e-04	3.6e-05	1.6e-04	6.8e-04	1.1e-03	6.5e-05	7.3e-06	3.1e-05	1.3e-04	2.2e-04
U-235	6.3e-01	6.7e-02	2.9e-01	1.3e+00	2.1e+00	1.2e-01	1.4e-02	5.8e-02	2.5e-01	4.2e-01
U-236	1.8e-04	1.9e-05	8.3e-05	3.6e-04	6.1e-04	3.5e-05	3.9e-06	1.6e-05	7.1e-05	1.2e-04
U-238	1.1e-01	1.2e-02	5.1e-02	2.2e-01	3.7e-01	2.2e-02	2.4e-03	1.0e-02	4.4e-02	7.3e-02
Np-237	9.1e-01	9.8e-02	4.5e-01	1.9e+00	3.1e+00	1.8e-01	2.0e-02	8.4e-02	3.6e-01	6.1e-01
Pu-236	3.5e-04	3.1e-05	1.5e-04	7.5e-04	1.2e-03	7.0e-05	6.2e-06	3.0e-05	1.5e-04	2.4e-04
Pu-238	1.3e-04	1.3e-05	5.9e-05	2.6e-04	4.3e-04	2.5e-05	2.7e-06	1.2e-05	5.0e-05	8.3e-05
Pu-239	2.4e-04	2.6e-05	1.1e-04	5.0e-04	8.3e-04	4.8e-05	5.3e-06	2.3e-05	9.9e-05	1.6e-04
Pu-240	1.2e-04	1.3e-05	5.7e-05	2.5e-04	4.1e-04	2.4e-05	2.7e-06	1.1e-05	4.9e-05	8.1e-05
Pu-241	1.1e-05	1.0e-06	4.8e-06	2.2e-05	3.6e-05	2.1e-06	2.1e-07	9.5e-07	4.4e-06	6.9e-06
Pu-242	1.1e-04	1.1e-05	5.0e-05	2.2e-04	3.6e-04	2.1e-05	2.3e-06	9.8e-06	4.3e-05	7.1e-05
Pu-244	1.7e+00	1.8e-01	7.9e-01	3.4e+00	5.7e+00	3.3e-01	3.7e-02	1.5e-01	6.8e-01	1.1e+00
Am-241	3.6e-02	3.9e-03	1.7e-02	7.4e-02	1.2e-01	7.1e-03	7.9e-04	3.3e-03	1.5e-02	2.4e-02
Am-242m	6.6e-02	6.0e-03	2.6e-02	1.1e-01	1.9e-01	1.1e-02	1.2e-03	5.1e-03	2.2e-02	3.7e-02
Am-243	7.4e-01	8.0e-02	3.5e-01	1.5e+00	2.5e+00	1.5e-01	1.6e-02	6.8e-02	3.0e-01	5.0e-01
Cm-242	1.2e-04	1.3e-05	5.7e-05	2.5e-04	4.1e-04	2.4e-05	2.6e-06	1.1e-05	4.9e-05	8.1e-05
Cm-243	4.8e-01	5.2e-02	2.3e-01	9.9e-01	1.6e+00	9.5e-02	1.0e-02	4.5e-02	1.9e-01	3.2e-01
Cm-244	1.0e-04	1.1e-05	4.9e-05	2.1e-04	3.5e-04	2.0e-05	2.3e-06	9.6e-06	4.2e-05	7.0e-05
Cm-245	2.8e-01	3.0e-02	1.3e-01	5.8e-01	9.5e-01	5.5e-02	6.1e-03	2.6e-02	1.1e-01	1.9e-01
Cm-246	9.6e-05	1.0e-05	4.5e-05	2.0e-04	3.2e-04	1.9e-05	2.1e-06	8.9e-06	3.9e-05	6.5e-05
Cm-247	1.5e+00	1.7e-01	7.2e-01	3.2e+00	5.2e+00	3.0e-01	3.4e-02	1.4e-01	6.2e-01	1.0e+00
Cm-248	7.3e-05	7.8e-06	3.4e-05	1.5e-04	2.5e-04	1.4e-05	1.6e-06	6.7e-06	2.9e-05	4.9e-05
Bk-249	2.9e-04	2.1e-05	1.2e-04	6.2e-04	1.0e-03	5.7e-05	4.3e-06	2.4e-05	1.2e-04	2.0e-04
Cf-248	9.6e-05	1.0e-05	4.5e-05	2.0e-04	3.2e-04	1.9e-05	2.1e-06	8.9e-06	3.9e-05	6.4e-05
Cf-249	1.5e+00	1.6e-01	7.2e-01	3.1e+00	5.2e+00	3.0e-01	3.4e-02	1.4e-01	6.1e-01	1.0e+00
Cf-250	9.8e-05	1.0e-05	4.6e-05	2.0e-04	3.3e-04	1.9e-05	2.1e-06	9.0e-06	3.9e-05	6.5e-05
Cf-251	4.4e-01	4.7e-02	2.0e-01	8.9e-01	1.5e+00	8.6e-02	9.5e-03	4.0e-02	1.7e-01	2.9e-01
Cf-252	1.4e-04	1.5e-05	6.7e-05	2.9e-04	4.8e-04	2.8e-05	3.1e-06	1.3e-05	5.7e-05	9.5e-05
Cf-254	2.1e-07	2.2e-08	1.0e-07	4.5e-07	7.1e-07	4.2e-08	4.4e-09	2.0e-08	8.9e-08	1.4e-07
Es-254	4.2e+00	4.5e-01	2.0e+00	8.6e+00	1.4e+01	8.3e-01	9.2e-02	3.9e-01	1.7e+00	2.8e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.53 Normalized effective dose equivalents from inhalation: Slag disposal–industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.4e-04	1.1e-05	8.5e-05	3.1e-04	4.6e-04	2.7e-05	2.2e-06	1.3e-05	6.1e-05	9.1e-05
P-32	4.5e-05	2.1e-06	1.6e-05	1.0e-04	1.6e-04	8.8e-06	4.3e-07	3.2e-06	2.0e-05	3.3e-05
S-35	7.2e-05	6.7e-06	3.2e-05	1.5e-04	2.5e-04	1.4e-05	1.3e-06	6.5e-06	3.0e-05	5.0e-05
Cl-36	2.4e-04	1.4e-05	9.2e-05	5.2e-04	8.4e-04	4.6e-05	2.7e-06	1.8e-05	1.0e-04	1.6e-04
K-40	2.3e-04	1.8e-05	1.1e-04	5.1e-04	7.9e-04	4.5e-05	3.6e-06	2.1e-05	1.0e-04	1.5e-04
Ca-41	5.8e-05	5.4e-06	2.6e-05	1.2e-04	2.0e-04	1.1e-05	1.1e-06	5.2e-06	2.4e-05	3.9e-05
Ca-45	2.5e-04	2.3e-05	1.1e-04	5.3e-04	8.4e-04	4.8e-05	4.6e-06	2.2e-05	1.0e-04	1.7e-04
Sc-46	9.6e-04	8.8e-05	4.3e-04	2.1e-03	3.3e-03	1.9e-04	1.8e-05	8.5e-05	4.1e-04	6.5e-04
Cr-51	1.3e-06	0.0e+00	4.7e-07	3.4e-06	5.5e-06	2.6e-07	0.0e+00	9.2e-08	6.6e-07	1.1e-06
Mn-53	1.2e-05	1.0e-07	5.0e-06	3.1e-05	4.4e-05	2.4e-06	2.0e-08	9.9e-07	6.1e-06	8.7e-06
Mn-54	1.5e-04	1.3e-06	8.3e-05	3.8e-04	5.5e-04	3.0e-05	2.5e-07	1.2e-05	7.6e-05	1.1e-04
Fe-55	9.2e-07	0.0e+00	3.4e-07	2.4e-06	3.7e-06	1.8e-07	0.0e+00	6.7e-08	4.7e-07	7.2e-07
Fe-59	5.1e-06	0.0e+00	1.9e-06	1.3e-05	2.0e-05	1.0e-06	0.0e+00	3.7e-07	2.5e-06	4.0e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	5.7e-05	5.2e-06	2.6e-05	1.2e-04	2.0e-04	1.1e-05	1.0e-06	5.1e-06	2.4e-05	3.9e-05
Sr-89	1.7e-04	1.6e-05	7.8e-05	3.8e-04	6.0e-04	3.4e-05	3.1e-06	1.5e-05	7.5e-05	1.2e-04
Sr-90	1.1e-02	1.0e-03	4.8e-03	2.3e-02	3.6e-02	2.1e-03	2.0e-04	9.6e-04	4.5e-03	7.2e-03
Y-91	1.4e-03	1.3e-04	6.2e-04	3.0e-03	4.8e-03	2.7e-04	2.5e-05	1.2e-04	6.0e-04	9.4e-04
Zr-93	3.6e-03	3.4e-04	1.6e-03	7.7e-03	1.2e-02	7.1e-04	6.8e-05	3.2e-04	1.5e-03	2.4e-03
Zr-95	5.7e-04	5.3e-05	2.6e-04	1.2e-03	1.9e-03	1.1e-04	1.1e-05	5.1e-05	2.4e-04	3.9e-04
Nb-93m	1.3e-03	1.2e-04	5.7e-04	2.7e-03	4.3e-03	2.5e-04	2.4e-05	1.1e-04	5.3e-04	8.5e-04
Nb-94	1.8e-02	1.7e-03	8.1e-03	3.8e-02	6.1e-02	3.5e-03	3.4e-04	1.6e-03	7.5e-03	1.2e-02
Nb-95	1.3e-04	1.1e-05	5.6e-05	2.8e-04	4.4e-04	2.5e-05	2.1e-06	1.1e-05	5.5e-05	8.6e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.3e-05	0.0e+00	5.0e-06	3.5e-05	5.5e-05	2.7e-06	0.0e+00	9.8e-07	6.8e-06	1.1e-05
Sb-125	1.1e-05	0.0e+00	3.9e-06	2.8e-05	4.4e-05	2.1e-06	0.0e+00	7.7e-07	5.6e-06	8.6e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.7e-04	9.5e-06	6.7e-05	3.9e-04	6.0e-04	3.4e-05	1.9e-06	1.3e-05	7.5e-05	1.2e-04
I-129	1.8e-03	1.0e-04	7.3e-04	4.1e-03	6.4e-03	3.6e-04	2.1e-05	1.4e-04	8.1e-04	1.3e-03
I-131	3.0e-05	4.2e-07	8.9e-06	6.6e-05	1.2e-04	5.9e-06	8.4e-08	1.4e-06	1.3e-05	2.4e-05
Cs-134	2.2e-04	3.6e-06	2.8e-05	3.5e-04	8.7e-04	4.3e-05	7.2e-07	5.5e-06	6.9e-05	1.7e-04
Cs-135	2.2e-05	3.6e-07	2.8e-06	3.6e-05	9.0e-05	4.4e-06	7.2e-08	5.5e-07	7.1e-06	1.8e-05
Cs-137	1.6e-04	2.5e-06	2.0e-05	2.5e-04	6.3e-04	3.1e-05	5.1e-07	3.9e-06	5.0e-05	1.2e-04
Ba-133	3.4e-04	3.1e-05	1.5e-04	7.1e-04	1.1e-03	6.6e-05	6.3e-06	3.0e-05	1.4e-04	2.3e-04
Ce-139	3.3e-04	3.1e-05	1.5e-04	7.0e-04	1.1e-03	6.4e-05	6.1e-06	2.9e-05	1.4e-04	2.2e-04
Ce-141	1.9e-04	1.5e-05	8.1e-05	4.1e-04	6.4e-04	3.7e-05	3.0e-06	1.6e-05	8.1e-05	1.3e-04
Ce-144	1.5e-02	1.4e-03	6.7e-03	3.2e-02	5.1e-02	2.9e-03	2.8e-04	1.3e-03	6.2e-03	9.9e-03
Pm-147	1.7e-03	1.5e-04	7.5e-04	3.5e-03	5.6e-03	3.3e-04	3.1e-05	1.5e-04	6.9e-04	1.1e-03

Table F1.53 Normalized effective dose equivalents from inhalation: Slag disposal-Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.3e-03	1.2e-04	5.9e-04	2.8e-03	4.4e-03	2.5e-04	2.4e-05	1.2e-04	5.4e-04	8.7e-04
Eu-152	9.5e-03	8.9e-04	4.3e-03	2.0e-02	3.2e-02	1.9e-03	1.8e-04	8.5e-04	4.0e-03	6.5e-03
Eu-154	1.2e-02	1.1e-03	5.5e-03	2.6e-02	4.2e-02	2.4e-03	2.3e-04	1.1e-03	5.1e-03	8.3e-03
Eu-155	1.8e-03	1.7e-04	8.0e-04	3.8e-03	6.0e-03	3.5e-04	3.3e-05	1.6e-04	7.4e-04	1.2e-03
Gd-153	3.7e-04	3.5e-05	1.7e-04	7.9e-04	1.3e-03	7.3e-05	6.9e-06	3.3e-05	1.6e-04	2.5e-04
Tb-160	7.7e-04	7.1e-05	3.5e-04	1.7e-03	2.7e-03	1.5e-04	1.4e-05	6.9e-05	3.3e-04	5.2e-04
Tm-170	9.4e-04	8.8e-05	4.3e-04	2.0e-03	3.2e-03	1.8e-04	1.8e-05	8.4e-05	3.9e-04	6.4e-04
Tm-171	3.8e-04	3.6e-05	1.7e-04	8.1e-04	1.3e-03	7.5e-05	7.2e-06	3.4e-05	1.6e-04	2.6e-04
Ta-182	1.6e-03	1.5e-04	7.1e-04	3.3e-03	5.4e-03	3.1e-04	2.9e-05	1.4e-04	6.6e-04	1.1e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.7e-01	3.5e-02	1.7e-01	8.0e-01	1.3e+00	7.4e-02	7.0e-03	3.3e-02	1.6e-01	2.5e-01
Ra-228	7.3e-01	5.8e-02	3.1e-01	1.6e+00	2.5e+00	1.4e-01	1.2e-02	6.1e-02	3.1e-01	4.9e-01
Ac-227	5.7e+01	5.3e+00	2.6e+01	1.2e+02	1.9e+02	1.1e+01	1.1e+00	5.1e+00	2.4e+01	3.8e+01
Th-228	1.4e+01	1.3e+00	6.5e+00	3.1e+01	4.9e+01	2.8e+00	2.7e-01	1.3e+00	6.0e+00	9.7e+00
Th-229	7.5e+01	7.1e+00	3.4e+01	1.6e+02	2.6e+02	1.5e+01	1.4e+00	6.7e+00	3.2e+01	5.1e+01
Th-230	1.1e+01	1.1e+00	5.1e+00	2.4e+01	3.9e+01	2.2e+00	2.1e-01	1.0e+00	4.8e+00	7.6e+00
Th-232	5.0e+01	4.7e+00	2.2e+01	1.1e+02	1.7e+02	9.8e+00	9.3e-01	4.4e+00	2.1e+01	3.4e+01
Pa-231	3.7e+01	3.5e+00	1.7e+01	7.9e+01	1.3e+02	7.3e+00	7.0e-01	3.3e+00	1.6e+01	2.5e+01
U-232	2.9e+01	2.7e+00	1.3e+01	6.2e+01	9.8e+01	5.7e+00	5.5e-01	2.6e+00	1.2e+01	2.0e+01
U-233	5.9e+00	5.5e-01	2.6e+00	1.2e+01	2.0e+01	1.2e+00	1.1e-01	5.2e-01	2.5e+00	4.0e+00
U-234	5.7e+00	5.4e-01	2.6e+00	1.2e+01	2.0e+01	1.1e+00	1.1e-01	5.1e-01	2.4e+00	3.9e+00
U-235	5.3e+00	5.0e-01	2.4e+00	1.1e+01	1.8e+01	1.0e+00	1.0e-01	4.8e-01	2.2e+00	3.6e+00
U-236	5.4e+00	5.1e-01	2.4e+00	1.2e+01	1.8e+01	1.1e+00	1.0e-01	4.9e-01	2.3e+00	3.7e+00
U-238	5.1e+00	4.8e-01	2.3e+00	1.1e+01	1.7e+01	1.0e+00	9.6e-02	4.6e-01	2.2e+00	3.5e+00
Np-237	2.3e+01	2.2e+00	1.1e+01	5.0e+01	7.9e+01	4.6e+00	4.4e-01	2.1e+00	9.8e+00	1.6e+01
Pu-236	5.5e+00	5.1e-01	2.5e+00	1.2e+01	1.9e+01	1.1e+00	1.0e-01	4.9e-01	2.3e+00	3.7e+00
Pu-238	1.2e+01	1.2e+00	5.6e+00	2.6e+01	4.2e+01	2.5e+00	2.3e-01	1.1e+00	5.2e+00	8.4e+00
Pu-239	1.3e+01	1.2e+00	6.0e+00	2.8e+01	4.5e+01	2.6e+00	2.5e-01	1.2e+00	5.6e+00	9.0e+00
Pu-240	1.3e+01	1.2e+00	6.0e+00	2.8e+01	4.5e+01	2.6e+00	2.5e-01	1.2e+00	5.6e+00	9.0e+00
Pu-241	2.2e-01	2.0e-02	9.8e-02	4.6e-01	7.4e-01	4.3e-02	4.1e-03	1.9e-02	9.1e-02	1.5e-01
Pu-242	1.3e+01	1.2e+00	5.7e+00	2.7e+01	4.3e+01	2.5e+00	2.4e-01	1.1e+00	5.3e+00	8.6e+00
Pu-244	1.3e+01	1.2e+00	5.7e+00	2.7e+01	4.3e+01	2.5e+00	2.4e-01	1.1e+00	5.3e+00	8.5e+00
Am-241	1.9e+01	1.8e+00	8.7e+00	4.1e+01	6.6e+01	3.8e+00	3.6e-01	1.7e+00	8.0e+00	1.3e+01
Am-242m	1.9e+01	1.8e+00	8.6e+00	4.1e+01	6.5e+01	3.7e+00	3.6e-01	1.7e+00	8.0e+00	1.3e+01
Am-243	1.9e+01	1.8e+00	8.6e+00	4.1e+01	6.5e+01	3.7e+00	3.6e-01	1.7e+00	8.0e+00	1.3e+01
Cm-242	6.5e-01	6.1e-02	2.9e-01	1.4e+00	2.2e+00	1.3e-01	1.2e-02	5.8e-02	2.7e-01	4.4e-01
Cm-243	1.3e+01	1.2e+00	6.0e+00	2.8e+01	4.5e+01	2.6e+00	2.5e-01	1.2e+00	5.6e+00	9.0e+00
Cm-244	1.1e+01	1.0e+00	4.8e+00	2.3e+01	3.6e+01	2.1e+00	2.0e-01	9.6e-01	4.5e+00	7.2e+00
Cm-245	2.0e+01	1.8e+00	8.9e+00	4.2e+01	6.7e+01	3.9e+00	3.7e-01	1.8e+00	8.3e+00	1.3e+01
Cm-246	2.0e+01	1.8e+00	8.8e+00	4.2e+01	6.7e+01	3.8e+00	3.7e-01	1.7e+00	8.2e+00	1.3e+01
Cm-247	1.8e+01	1.7e+00	8.1e+00	3.8e+01	6.1e+01	3.5e+00	3.4e-01	1.6e+00	7.5e+00	1.2e+01
Cm-248	7.1e+01	6.7e+00	3.2e+01	1.5e+02	2.4e+02	1.4e+01	1.3e+00	6.4e+00	3.0e+01	4.8e+01
Bk-249	5.9e-02	5.5e-03	2.6e-02	1.2e-01	2.0e-01	1.2e-02	1.1e-03	5.2e-03	2.5e-02	3.9e-02
Cf-248	2.1e+00	1.9e-01	9.4e-01	4.4e+00	7.1e+00	4.1e-01	3.9e-02	1.9e-01	8.7e-01	1.4e+00
Cf-249	1.6e+01	1.5e+00	7.4e+00	3.5e+01	5.6e+01	3.2e+00	3.1e-01	1.5e+00	6.9e+00	1.1e+01
Cf-250	8.9e+00	8.3e-01	4.0e+00	1.9e+01	3.0e+01	1.7e+00	1.7e-01	7.9e-01	3.7e+00	6.0e+00
Cf-251	1.7e+01	1.6e+00	7.6e+00	3.6e+01	5.7e+01	3.3e+00	3.2e-01	1.5e+00	7.1e+00	1.1e+01
Cf-252	6.6e+00	6.2e-01	3.0e+00	1.4e+01	2.3e+01	1.3e+00	1.2e-01	5.9e-01	2.8e+00	4.5e+00
Cf-254	8.5e+00	7.7e-01	3.8e+00	1.9e+01	2.9e+01	1.7e+00	1.5e-01	7.6e-01	3.6e+00	5.8e+00
Es-254	1.7e+00	1.6e-01	7.5e-01	3.5e+00	5.7e+00	3.3e-01	3.1e-02	1.5e-01	7.0e-01	1.1e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.54 Normalized effective dose equivalents from ingestion: Slag disposal–industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	6.8e-04	1.7e-05	2.6e-04	1.6e-03	2.4e-03	1.3e-04	3.5e-06	5.1e-05	3.2e-04	4.7e-04
P-32	2.1e-04	4.2e-06	8.9e-05	4.8e-04	8.2e-04	4.1e-05	8.3e-07	1.4e-05	9.4e-05	1.6e-04
S-35	4.4e-05	1.2e-06	1.6e-05	9.7e-05	1.5e-04	8.5e-06	2.5e-07	3.1e-06	1.9e-05	3.0e-05
Cl-36	1.1e-04	2.3e-06	3.6e-05	2.5e-04	4.1e-04	2.1e-05	4.5e-07	7.1e-06	4.9e-05	7.9e-05
K-40	1.1e-03	2.9e-05	4.3e-04	2.8e-03	4.1e-03	2.2e-04	5.8e-06	8.5e-05	5.4e-04	8.0e-04
Ca-41	1.8e-04	5.2e-06	6.6e-05	4.1e-04	6.4e-04	3.6e-05	1.1e-06	1.3e-05	7.9e-05	1.2e-04
Ca-45	3.9e-04	1.1e-05	1.4e-04	8.6e-04	1.4e-03	7.6e-05	2.3e-06	2.8e-05	1.7e-04	2.7e-04
Sc-46	6.9e-04	1.9e-05	2.5e-04	1.5e-03	2.4e-03	1.3e-04	3.9e-06	5.0e-05	3.0e-04	4.7e-04
Cr-51	1.9e-06	0.0e+00	5.7e-07	5.0e-06	8.4e-06	3.8e-07	0.0e+00	1.1e-07	1.0e-06	1.6e-06
Mn-53	8.8e-06	5.2e-08	3.3e-06	2.4e-05	3.5e-05	1.7e-06	1.0e-08	6.5e-07	4.7e-06	6.8e-06
Mn-54	2.1e-04	1.2e-06	7.8e-05	5.6e-04	8.3e-04	4.1e-05	2.4e-07	1.5e-05	1.1e-04	1.6e-04
Fe-55	1.4e-06	0.0e+00	4.5e-07	3.8e-06	5.8e-06	2.7e-07	0.0e+00	8.9e-08	7.4e-07	1.1e-06
Fe-59	9.2e-06	0.0e+00	3.0e-06	2.5e-05	3.8e-05	1.8e-06	0.0e+00	6.0e-07	4.9e-06	7.5e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.9e-04	5.5e-06	7.1e-05	4.4e-04	6.9e-04	3.8e-05	1.1e-06	1.4e-05	8.6e-05	1.4e-04
Sr-89	8.2e-04	2.3e-05	3.0e-04	1.8e-03	2.9e-03	1.6e-04	4.7e-06	6.0e-05	3.6e-04	5.8e-04
Sr-90	2.2e-02	6.2e-04	7.9e-03	4.9e-02	7.6e-02	4.3e-03	1.3e-04	1.6e-03	9.6e-03	1.5e-02
Y-91	9.0e-04	2.6e-05	3.3e-04	2.0e-03	3.2e-03	1.8e-04	5.2e-06	6.5e-05	4.0e-04	6.3e-04
Zr-93	2.4e-04	6.9e-06	8.6e-05	5.3e-04	8.3e-04	4.7e-05	1.4e-06	1.7e-05	1.0e-04	1.6e-04
Zr-95	5.2e-04	1.5e-05	1.9e-04	1.1e-03	1.8e-03	1.0e-04	3.0e-06	3.7e-05	2.3e-04	3.5e-04
Nb-93m	7.5e-05	2.1e-06	2.7e-05	1.7e-04	2.6e-04	1.5e-05	4.4e-07	5.3e-06	3.3e-05	5.1e-05
Nb-94	1.0e-03	2.9e-05	3.7e-04	2.3e-03	3.6e-03	2.0e-04	6.0e-06	7.3e-05	4.5e-04	7.1e-04
Nb-95	1.9e-04	5.1e-06	6.9e-05	4.2e-04	6.8e-04	3.7e-05	1.0e-06	1.4e-05	8.4e-05	1.3e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.8e-05	0.0e+00	5.5e-06	4.8e-05	7.8e-05	3.5e-06	0.0e+00	1.1e-06	9.5e-06	1.6e-05
Sb-125	9.4e-06	0.0e+00	2.9e-06	2.6e-05	4.1e-05	1.9e-06	0.0e+00	5.7e-07	5.0e-06	8.0e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	9.2e-04	2.0e-05	3.1e-04	2.0e-03	3.4e-03	1.8e-04	3.9e-06	6.2e-05	4.0e-04	6.7e-04
I-129	9.9e-03	2.1e-04	3.3e-03	2.2e-02	3.6e-02	1.9e-03	4.3e-05	6.6e-04	4.3e-03	7.1e-03
I-131	1.6e-04	9.8e-07	3.1e-05	3.5e-04	6.6e-04	3.1e-05	2.0e-07	6.1e-06	6.9e-05	1.3e-04
Cs-134	1.2e-03	7.5e-06	1.2e-04	1.6e-03	4.4e-03	2.3e-04	1.4e-06	2.5e-05	3.1e-04	8.6e-04
Cs-135	1.2e-04	7.5e-07	1.2e-05	1.6e-04	4.3e-04	2.3e-05	1.4e-07	2.5e-06	3.1e-05	8.6e-05
Cs-137	8.3e-04	5.3e-06	8.8e-05	1.1e-03	3.0e-03	1.6e-04	1.0e-06	1.7e-05	2.2e-04	6.1e-04
Ba-133	4.9e-04	1.4e-05	1.8e-04	1.1e-03	1.7e-03	9.5e-05	2.8e-06	3.5e-05	2.1e-04	3.3e-04
Ce-139	1.4e-04	3.9e-06	5.0e-05	3.1e-04	4.8e-04	2.7e-05	8.0e-07	9.8e-06	6.0e-05	9.5e-05
Ce-141	2.0e-04	5.4e-06	7.3e-05	4.5e-04	7.2e-04	3.9e-05	1.1e-06	1.5e-05	9.0e-05	1.4e-04
Ce-144	2.8e-03	8.0e-05	1.0e-03	6.2e-03	9.8e-03	5.5e-04	1.6e-05	2.0e-04	1.2e-03	1.9e-03
Pm-147	1.5e-04	4.2e-06	5.3e-05	3.3e-04	5.2e-04	2.9e-05	8.6e-07	1.0e-05	6.4e-05	1.0e-04

Table F1.54 Normalized effective dose equivalents from ingestion: Slag disposal-Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.6e-05	1.6e-06	2.0e-05	1.2e-04	1.9e-04	1.1e-05	3.2e-07	4.0e-06	2.4e-05	3.8e-05
Eu-152	9.3e-04	2.6e-05	3.4e-04	2.1e-03	3.2e-03	1.8e-04	5.3e-06	6.8e-05	4.0e-04	6.4e-04
Eu-154	1.4e-03	3.9e-05	4.9e-04	3.0e-03	4.8e-03	2.7e-04	7.9e-06	9.7e-05	5.9e-04	9.3e-04
Eu-155	2.2e-04	6.2e-06	7.8e-05	4.8e-04	7.5e-04	4.2e-05	1.3e-06	1.5e-05	9.4e-05	1.5e-04
Gd-153	1.5e-04	4.4e-06	5.5e-05	3.4e-04	5.4e-04	3.0e-05	8.9e-07	1.1e-05	6.6e-05	1.0e-04
Tb-160	6.9e-04	2.0e-05	2.5e-04	1.5e-03	2.5e-03	1.3e-04	4.0e-06	5.0e-05	3.0e-04	4.8e-04
Tm-170	6.3e-04	1.8e-05	2.3e-04	1.4e-03	2.2e-03	1.2e-04	3.7e-06	4.5e-05	2.7e-04	4.3e-04
Tm-171	5.9e-05	1.7e-06	2.2e-05	1.3e-04	2.1e-04	1.2e-05	3.5e-07	4.2e-06	2.6e-05	4.0e-05
Ta-182	7.5e-04	2.2e-05	2.8e-04	1.7e-03	2.7e-03	1.5e-04	4.4e-06	5.4e-05	3.3e-04	5.2e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.9e-01	5.5e-03	7.0e-02	4.3e-01	6.7e-01	3.8e-02	1.1e-03	1.4e-02	8.4e-02	1.3e-01
Ra-228	2.1e-01	6.0e-03	7.6e-02	4.6e-01	7.3e-01	4.1e-02	1.2e-03	1.5e-02	9.1e-02	1.4e-01
Ac-227	2.1e+00	6.0e-02	7.7e-01	4.7e+00	7.4e+00	4.1e-01	1.2e-02	1.5e-01	9.2e-01	1.5e+00
Th-228	1.1e-01	3.2e-03	4.1e-02	2.5e-01	3.9e-01	2.2e-02	6.6e-04	8.0e-03	4.9e-02	7.7e-02
Th-229	5.8e-01	1.7e-02	2.1e-01	1.3e+00	2.0e+00	1.1e-01	3.4e-03	4.1e-02	2.5e-01	4.0e-01
Th-230	7.9e-02	2.2e-03	2.8e-02	1.8e-01	2.7e-01	1.5e-02	4.6e-04	5.6e-03	3.4e-02	5.4e-02
Th-232	3.9e-01	1.1e-02	1.4e-01	8.6e-01	1.4e+00	7.7e-02	2.3e-03	2.8e-02	1.7e-01	2.7e-01
Pa-231	1.5e+00	4.4e-02	5.5e-01	3.4e+00	5.3e+00	3.0e-01	8.9e-03	1.1e-01	6.7e-01	1.0e+00
U-232	1.4e-02	4.0e-04	5.0e-03	3.1e-02	4.9e-02	2.8e-03	8.0e-05	9.9e-04	6.2e-03	9.6e-03
U-233	3.8e-03	1.1e-04	1.4e-03	8.4e-03	1.3e-02	7.5e-04	2.2e-05	2.7e-04	1.7e-03	2.6e-03
U-234	3.8e-03	1.1e-04	1.4e-03	8.3e-03	1.3e-02	7.4e-04	2.2e-05	2.7e-04	1.6e-03	2.6e-03
U-235	4.0e-03	1.1e-04	1.5e-03	8.9e-03	1.4e-02	7.9e-04	2.4e-05	2.9e-04	1.8e-03	2.8e-03
U-236	3.5e-03	1.0e-04	1.3e-03	7.8e-03	1.2e-02	7.0e-04	2.1e-05	2.5e-04	1.5e-03	2.4e-03
U-238	5.4e-03	1.5e-04	1.9e-03	1.2e-02	1.9e-02	1.1e-03	3.1e-05	3.8e-04	2.3e-03	3.7e-03
Np-237	8.4e-01	1.8e-02	2.3e-01	1.4e+00	2.2e+00	1.3e-01	3.7e-03	4.6e-02	2.8e-01	4.4e-01
Pu-236	1.5e-01	4.7e-03	5.9e-02	3.6e-01	5.8e-01	3.2e-02	9.6e-04	1.2e-02	7.1e-02	1.1e-01
Pu-238	4.6e-01	1.3e-02	1.7e-01	1.0e+00	1.6e+00	9.0e-02	2.7e-03	3.3e-02	2.0e-01	3.1e-01
Pu-239	5.1e-01	1.5e-02	1.8e-01	1.1e+00	1.8e+00	1.0e-01	2.9e-03	3.6e-02	2.2e-01	3.5e-01
Pu-240	5.1e-01	1.5e-02	1.8e-01	1.1e+00	1.8e+00	1.0e-01	2.9e-03	3.6e-02	2.2e-01	3.5e-01
Pu-241	9.9e-03	2.8e-04	3.6e-03	2.2e-02	3.5e-02	1.9e-03	5.7e-05	7.0e-04	4.3e-03	6.8e-03
Pu-242	4.8e-01	1.4e-02	1.7e-01	1.1e+00	1.7e+00	9.5e-02	2.8e-03	3.4e-02	2.1e-01	3.3e-01
Pu-244	4.8e-01	1.4e-02	1.7e-01	1.1e+00	1.7e+00	9.4e-02	2.8e-03	3.4e-02	2.1e-01	3.3e-01
Am-241	5.2e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	1.0e-01	3.0e-03	3.7e-02	2.3e-01	3.6e-01
Am-242m	5.2e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	1.0e-01	3.0e-03	3.7e-02	2.3e-01	3.6e-01
Am-243	5.2e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	1.0e-01	3.0e-03	3.7e-02	2.3e-01	3.6e-01
Cm-242	1.4e-02	4.2e-04	5.3e-03	3.2e-02	5.1e-02	2.8e-03	8.4e-05	1.0e-03	6.3e-03	9.9e-03
Cm-243	3.6e-01	1.0e-02	1.3e-01	8.0e-01	1.2e+00	7.1e-02	2.1e-03	2.6e-02	1.6e-01	2.5e-01
Cm-244	2.9e-01	8.3e-03	1.0e-01	6.4e-01	1.0e+00	5.7e-02	1.7e-03	2.1e-02	1.3e-01	2.0e-01
Cm-245	5.4e-01	1.5e-02	1.9e-01	1.2e+00	1.9e+00	1.1e-01	3.1e-03	3.8e-02	2.3e-01	3.7e-01
Cm-246	5.3e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	1.0e-01	3.1e-03	3.8e-02	2.3e-01	3.6e-01
Cm-247	4.9e-01	1.4e-02	1.8e-01	1.1e+00	1.7e+00	9.6e-02	2.9e-03	3.5e-02	2.1e-01	3.4e-01
Cm-248	2.0e+00	5.6e-02	7.1e-01	4.4e+00	6.8e+00	3.8e-01	1.1e-02	1.4e-01	8.5e-01	1.3e+00
Bk-249	1.7e-03	4.9e-05	6.2e-04	3.8e-03	6.0e-03	3.4e-04	1.0e-05	1.2e-04	7.5e-04	1.2e-03
Cf-248	4.6e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01	8.9e-03	2.7e-04	3.3e-03	2.0e-02	3.1e-02
Cf-249	6.8e-01	1.9e-02	2.5e-01	1.5e+00	2.4e+00	1.3e-01	4.0e-03	4.9e-02	3.0e-01	4.7e-01
Cf-250	3.0e-01	8.7e-03	1.1e-01	6.8e-01	1.1e+00	6.0e-02	1.8e-03	2.2e-02	1.3e-01	2.1e-01
Cf-251	7.0e-01	2.0e-02	2.5e-01	1.6e+00	2.4e+00	1.4e-01	4.0e-03	5.0e-02	3.0e-01	4.8e-01
Cf-252	1.5e-01	4.3e-03	5.5e-02	3.4e-01	5.3e-01	3.0e-02	8.8e-04	1.1e-02	6.6e-02	1.0e-01
Cf-254	2.3e-01	6.6e-03	8.5e-02	5.2e-01	8.2e-01	4.6e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01
Es-254	4.3e-02	1.2e-03	1.6e-02	9.5e-02	1.5e-01	8.4e-03	2.5e-04	3.0e-03	1.9e-02	2.9e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.55 Normalized effective dose equivalents from all pathways: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.1e+00	2.9e-02	8.0e-01	5.7e+00	8.2e+00	4.1e-01	6.0e-03	1.6e-01	1.1e+00	1.6e+00
P-32	8.0e-04	8.5e-06	2.6e-04	2.0e-03	3.3e-03	1.6e-04	1.3e-06	5.1e-05	4.0e-04	6.5e-04
S-35	5.2e-05	7.2e-07	2.0e-05	1.4e-04	2.0e-04	1.0e-05	1.5e-07	4.0e-06	2.6e-05	4.0e-05
Cl-36	3.5e-04	3.9e-06	1.2e-04	9.1e-04	1.4e-03	6.9e-05	7.7e-07	2.4e-05	1.8e-04	2.7e-04
K-40	1.6e-01	2.4e-03	6.3e-02	4.5e-01	6.4e-01	3.2e-02	4.8e-04	1.3e-02	8.8e-02	1.3e-01
Ca-41	1.0e-04	1.1e-06	3.5e-05	2.7e-04	4.0e-04	2.0e-05	2.3e-07	6.9e-06	5.3e-05	7.9e-05
Ca-45	2.9e-04	3.7e-06	1.1e-04	7.4e-04	1.1e-03	5.6e-05	7.4e-07	2.1e-05	1.5e-04	2.2e-04
Sc-46	3.3e+00	4.6e-02	1.3e+00	8.6e+00	1.2e+01	6.5e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00
Cr-51	6.3e-03	0.0e+00	1.3e-03	1.8e-02	2.9e-02	1.2e-03	0.0e+00	2.6e-04	3.5e-03	5.7e-03
Mn-53	1.0e-05	2.3e-08	2.8e-06	3.0e-05	4.4e-05	2.0e-06	4.7e-09	5.5e-07	6.0e-06	8.8e-06
Mn-54	1.1e+00	2.6e-03	3.0e-01	3.2e+00	4.7e+00	2.1e-01	5.2e-04	6.0e-02	6.4e-01	9.2e-01
Fe-55	1.1e-06	0.0e+00	2.5e-07	3.2e-06	5.2e-06	2.2e-07	0.0e+00	5.0e-08	6.4e-07	1.0e-06
Fe-59	2.9e-02	0.0e+00	6.5e-03	8.5e-02	1.4e-01	5.7e-03	0.0e+00	1.4e-03	1.7e-02	2.7e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	7.1e-01	1.0e-02	2.9e-01	1.9e+00	2.7e+00	1.4e-01	2.1e-03	5.7e-02	3.6e-01	5.2e-01
Sr-89	2.4e-03	3.4e-05	9.5e-04	6.3e-03	8.9e-03	4.7e-04	6.8e-06	1.9e-04	1.2e-03	1.8e-03
Sr-90	2.2e-02	3.2e-04	8.7e-03	5.8e-02	8.5e-02	4.4e-03	6.4e-05	1.7e-03	1.1e-02	1.6e-02
Y-91	8.4e-03	1.2e-04	3.4e-03	2.2e-02	3.1e-02	1.7e-03	2.4e-05	6.7e-04	4.3e-03	6.2e-03
Zr-93	1.6e-03	2.3e-05	6.3e-04	4.2e-03	6.2e-03	3.2e-04	4.5e-06	1.3e-04	8.1e-04	1.2e-03
Zr-95	1.7e+00	2.6e-02	6.9e-01	4.5e+00	6.4e+00	3.4e-01	5.1e-03	1.4e-01	8.9e-01	1.2e+00
Nb-93m	8.0e-04	8.4e-06	2.3e-04	1.5e-03	2.3e-03	1.2e-04	1.7e-06	4.7e-05	3.0e-04	4.4e-04
Nb-94	3.4e+00	5.1e-02	1.3e+00	8.9e+00	1.3e+01	6.7e-01	1.0e-02	2.7e-01	1.8e+00	2.4e+00
Nb-95	8.3e-01	1.1e-02	3.3e-01	2.2e+00	3.2e+00	1.6e-01	2.2e-03	6.5e-02	4.2e-01	6.3e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.8e-02	0.0e+00	1.3e-02	1.7e-01	2.7e-01	1.1e-02	0.0e+00	2.5e-03	3.3e-02	5.3e-02
Sb-125	1.8e-02	0.0e+00	3.9e-03	5.1e-02	8.2e-02	3.5e-03	0.0e+00	7.7e-04	1.0e-02	1.6e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.4e-03	1.5e-05	4.7e-04	3.6e-03	5.7e-03	2.8e-04	2.9e-06	9.3e-05	7.1e-04	1.1e-03
I-129	8.0e-03	5.5e-05	1.8e-03	1.5e-02	2.5e-02	1.2e-03	1.1e-05	3.6e-04	3.0e-03	4.9e-03
I-131	1.6e-02	4.3e-05	2.7e-03	3.8e-02	7.2e-02	3.2e-03	8.8e-06	5.3e-04	7.6e-03	1.4e-02
Cs-134	2.9e-01	1.0e-03	3.9e-02	4.8e-01	1.2e+00	5.8e-02	2.1e-04	7.6e-03	9.4e-02	2.3e-01
Cs-135	4.8e-05	1.3e-07	5.6e-06	7.6e-05	1.8e-04	9.4e-06	2.5e-08	1.1e-06	1.5e-05	3.6e-05
Cs-137	1.1e-01	3.9e-04	1.4e-02	1.8e-01	4.4e-01	2.1e-02	7.6e-05	2.8e-03	3.5e-02	8.7e-02
Ba-133	8.8e-01	1.0e-02	2.7e-01	1.8e+00	2.6e+00	1.3e-01	2.1e-03	5.5e-02	3.6e-01	5.0e-01
Ce-139	1.9e-01	2.8e-03	7.5e-02	4.9e-01	8.9e-01	3.7e-02	5.5e-04	1.5e-02	9.6e-02	1.4e-01
Ce-141	5.4e-02	7.0e-04	2.1e-02	1.4e-01	2.1e-01	1.1e-02	1.4e-04	4.1e-03	2.7e-02	4.1e-02
Ce-144	1.1e-01	1.7e-03	4.5e-02	2.9e-01	4.1e-01	2.2e-02	3.3e-04	8.9e-03	5.7e-02	7.9e-02
Pm-147	7.7e-04	1.1e-05	3.0e-04	2.0e-03	2.9e-03	1.5e-04	2.2e-06	6.0e-05	3.9e-04	5.7e-04

Table F1.55 Normalized effective dose equivalents from all pathways: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.7e-04	7.9e-06	2.2e-04	1.5e-03	2.2e-03	1.1e-04	1.6e-06	4.4e-05	2.9e-04	4.2e-04
Eu-152	2.4e+00	3.6e-02	9.7e-01	6.8e+00	9.0e+00	4.8e-01	7.3e-03	1.9e-01	1.3e+00	1.8e+00
Eu-154	2.7e+00	4.0e-02	1.1e+00	7.0e+00	9.9e+00	5.2e-01	7.9e-03	2.1e-01	1.4e+00	1.9e+00
Eu-155	6.3e-02	9.5e-04	2.5e-02	1.7e-01	2.4e-01	1.2e-02	1.9e-04	5.1e-03	3.3e-02	4.6e-02
Gd-153	7.7e-02	1.1e-03	3.1e-02	2.0e-01	2.9e-01	1.5e-02	2.3e-04	6.2e-03	4.0e-02	5.6e-02
Tb-160	1.7e+00	2.5e-02	6.9e-01	4.5e+00	6.4e+00	3.4e-01	5.0e-03	1.4e-01	8.8e-01	1.3e+00
Tm-170	4.9e-03	7.5e-05	2.0e-03	1.3e-02	1.9e-02	9.8e-04	1.5e-05	4.0e-04	2.5e-03	3.6e-03
Tm-171	5.6e-04	8.6e-06	2.3e-04	1.5e-03	2.1e-03	1.1e-04	1.7e-06	4.6e-05	2.9e-04	4.0e-04
Ta-182	2.2e+00	3.3e-02	9.0e-01	5.8e+00	8.4e+00	4.4e-01	6.6e-03	1.8e-01	1.1e+00	1.6e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	4.1e+00	6.2e-02	1.7e+00	1.1e+01	1.5e+01	8.1e-01	1.2e-02	3.3e-01	2.2e+00	3.0e+00
Ra-228	2.6e+00	3.9e-02	1.0e+00	6.8e+00	9.5e+00	5.1e-01	7.8e-03	2.1e-01	1.3e+00	1.8e+00
Ac-227	2.5e+01	3.6e-01	9.9e+00	6.6e+01	9.8e+01	5.0e+00	7.0e-02	2.0e+00	1.3e+01	1.9e+01
Th-228	9.5e+00	1.4e-01	3.8e+00	2.5e+01	3.6e+01	1.9e+00	2.8e-02	7.6e-01	4.9e+00	6.9e+00
Th-229	3.2e+01	4.5e-01	1.3e+01	8.5e+01	1.2e+02	6.4e+00	8.9e-02	2.5e+00	1.6e+01	2.4e+01
Th-230	4.8e+00	6.6e-02	1.8e+00	1.2e+01	1.8e+01	9.4e-01	1.3e-02	3.7e-01	2.4e+00	3.6e+00
Th-232	2.1e+01	2.9e-01	8.1e+00	5.5e+01	8.1e+01	4.2e+00	5.8e-02	1.6e+00	1.1e+01	1.6e+01
Pa-231	1.6e+01	2.3e-01	6.4e+00	4.2e+01	6.3e+01	3.2e+00	4.5e-02	1.3e+00	8.3e+00	1.2e+01
U-232	1.2e+01	1.7e-01	4.7e+00	3.2e+01	4.7e+01	2.4e+00	3.4e-02	9.4e-01	6.2e+00	9.2e+00
U-233	2.5e+00	3.4e-02	9.5e-01	6.4e+00	9.5e+00	4.9e-01	6.7e-03	1.9e-01	1.2e+00	1.8e+00
U-234	2.4e+00	3.3e-02	9.3e-01	6.2e+00	9.3e+00	4.8e-01	6.6e-03	1.8e-01	1.2e+00	1.8e+00
U-235	2.5e+00	3.5e-02	9.7e-01	6.5e+00	9.5e+00	4.9e-01	7.0e-03	1.9e-01	1.3e+00	1.8e+00
U-236	2.3e+00	3.2e-02	8.8e-01	5.9e+00	8.8e+00	4.5e-01	6.2e-03	1.7e-01	1.1e+00	1.7e+00
U-238	2.2e+00	3.1e-02	8.5e-01	5.7e+00	8.5e+00	4.3e-01	6.0e-03	1.7e-01	1.1e+00	1.6e+00
Np-237	1.0e+01	1.5e-01	4.1e+00	2.7e+01	4.0e+01	2.1e+00	2.9e-02	8.1e-01	5.3e+00	7.7e+00
Pu-236	2.4e+00	3.3e-02	9.2e-01	6.1e+00	9.1e+00	4.7e-01	6.6e-03	1.8e-01	1.2e+00	1.8e+00
Pu-238	5.4e+00	7.6e-02	2.1e+00	1.4e+01	2.1e+01	1.1e+00	1.5e-02	4.2e-01	2.7e+00	4.0e+00
Pu-239	5.8e+00	8.1e-02	2.3e+00	1.5e+01	2.2e+01	1.1e+00	1.6e-02	4.5e-01	2.9e+00	4.3e+00
Pu-240	5.8e+00	8.1e-02	2.3e+00	1.5e+01	2.2e+01	1.1e+00	1.6e-02	4.5e-01	2.9e+00	4.3e+00
Pu-241	9.5e-02	1.3e-03	3.7e-02	2.5e-01	3.7e-01	1.9e-02	2.6e-04	7.3e-03	4.8e-02	7.0e-02
Pu-242	5.5e+00	7.7e-02	2.1e+00	1.4e+01	2.1e+01	1.1e+00	1.5e-02	4.3e-01	2.8e+00	4.1e+00
Pu-244	6.2e+00	8.8e-02	2.4e+00	1.6e+01	2.3e+01	1.2e+00	1.7e-02	4.8e-01	3.1e+00	4.5e+00
Am-241	8.3e+00	1.2e-01	3.2e+00	2.1e+01	3.2e+01	1.6e+00	2.3e-02	6.4e-01	4.2e+00	6.2e+00
Am-242m	8.2e+00	1.1e-01	3.2e+00	2.1e+01	3.2e+01	1.6e+00	2.3e-02	6.3e-01	4.2e+00	6.1e+00
Am-243	8.5e+00	1.2e-01	3.3e+00	2.2e+01	3.3e+01	1.7e+00	2.4e-02	6.6e-01	4.3e+00	6.3e+00
Cm-242	2.8e-01	3.9e-03	1.1e-01	7.2e-01	1.1e+00	5.5e-02	7.7e-04	2.2e-02	1.4e-01	2.1e-01
Cm-243	5.9e+00	8.3e-02	2.3e+00	1.5e+01	2.3e+01	1.2e+00	1.6e-02	4.6e-01	3.0e+00	4.4e+00
Cm-244	4.6e+00	6.4e-02	1.8e+00	1.2e+01	1.8e+01	9.1e-01	1.3e-02	3.6e-01	2.3e+00	3.4e+00
Cm-245	8.6e+00	1.2e-01	3.4e+00	2.2e+01	3.3e+01	1.7e+00	2.4e-02	6.6e-01	4.4e+00	6.4e+00
Cm-246	8.4e+00	1.2e-01	3.3e+00	2.2e+01	3.2e+01	1.7e+00	2.3e-02	6.5e-01	4.3e+00	6.3e+00
Cm-247	8.4e+00	1.2e-01	3.3e+00	2.2e+01	3.2e+01	1.7e+00	2.3e-02	6.5e-01	4.2e+00	6.2e+00
Cm-248	3.1e+01	4.3e-01	1.2e+01	8.0e+01	1.2e+02	6.1e+00	8.5e-02	2.4e+00	1.6e+01	2.3e+01
Bk-249	2.5e-02	3.6e-04	9.9e-03	6.6e-02	9.8e-02	5.0e-03	7.0e-05	2.0e-03	1.3e-02	1.9e-02
Cf-248	8.9e-01	1.2e-02	3.4e-01	2.3e+00	3.4e+00	1.8e-01	2.4e-03	6.9e-02	4.5e-01	6.6e-01
Cf-249	7.8e+00	1.1e-01	3.1e+00	2.0e+01	3.0e+01	1.5e+00	2.2e-02	6.1e-01	4.0e+00	5.8e+00
Cf-250	3.8e+00	5.4e-02	1.5e+00	9.9e+00	1.5e+01	7.6e-01	1.1e-02	3.0e-01	1.9e+00	2.9e+00
Cf-251	7.5e+00	1.1e-01	2.9e+00	1.9e+01	2.9e+01	1.5e+00	2.1e-02	5.9e-01	3.8e+00	5.6e+00
Cf-252	2.8e+00	4.0e-02	1.1e+00	7.3e+00	1.1e+01	5.6e-01	7.8e-03	2.2e-01	1.4e+00	2.1e+00
Cf-254	3.7e+00	4.9e-02	1.4e+00	9.4e+00	1.4e+01	7.2e-01	9.9e-03	2.8e-01	1.9e+00	2.7e+00
Es-254	2.5e+00	3.8e-02	1.0e+00	6.5e+00	9.2e+00	4.9e-01	7.5e-03	2.0e-01	1.3e+00	1.8e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.56 Normalized effective dose equivalents from external exposure: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.1e+00	2.9e-02	8.0e-01	5.7e+00	8.2e+00	4.1e-01	6.0e-03	1.6e-01	1.1e+00	1.6e+00
P-32	6.9e-04	5.7e-06	2.2e-04	1.7e-03	2.9e-03	1.4e-04	1.1e-06	4.4e-05	3.4e-04	5.6e-04
S-35	3.5e-06	5.2e-08	1.4e-06	9.1e-06	1.3e-05	6.9e-07	1.0e-08	2.8e-07	1.8e-06	2.6e-06
Cl-38	2.1e-04	2.2e-06	7.0e-05	5.4e-04	8.3e-04	4.0e-05	4.4e-07	1.4e-05	1.1e-04	1.6e-04
K-40	1.6e-01	2.4e-03	6.3e-02	4.5e-01	6.4e-01	3.2e-02	4.8e-04	1.3e-02	8.8e-02	1.3e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.9e-05	2.8e-07	7.5e-06	4.9e-05	7.0e-05	3.7e-06	5.6e-08	1.5e-06	9.6e-06	1.4e-05
Sc-46	3.3e+00	4.8e-02	1.3e+00	8.6e+00	1.2e+01	6.5e-01	9.5e-03	2.6e-01	1.7e+00	2.4e+00
Cr-51	6.3e-03	0.0e+00	1.3e-03	1.8e-02	2.9e-02	1.2e-03	0.0e+00	2.6e-04	3.5e-03	5.7e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.1e+00	2.6e-03	3.0e-01	3.2e+00	4.7e+00	2.1e-01	5.2e-04	6.0e-02	6.4e-01	9.2e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	2.9e-02	0.0e+00	6.9e-03	9.5e-02	1.4e-01	5.7e-03	0.0e+00	1.4e-03	1.7e-02	2.7e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	7.1e-01	1.0e-02	2.9e-01	1.9e+00	2.7e+00	1.4e-01	2.1e-03	5.7e-02	3.6e-01	5.2e-01
Sr-89	2.0e-03	2.8e-05	7.8e-04	5.1e-03	7.4e-03	3.9e-04	5.5e-06	1.5e-04	1.0e-03	1.5e-03
Sr-90	8.5e-03	1.3e-04	3.4e-03	2.2e-02	3.2e-02	1.7e-03	2.6e-05	6.8e-04	4.5e-03	6.2e-03
Y-91	7.5e-03	1.1e-04	3.0e-03	2.0e-02	2.8e-02	1.5e-03	2.1e-05	6.0e-04	3.8e-03	5.5e-03
Zr-93	1.5e-07	1.7e-09	4.9e-08	3.8e-07	5.8e-07	2.9e-08	3.3e-10	9.7e-09	7.6e-08	1.2e-07
Zr-95	1.7e+00	2.6e-02	6.9e-01	4.5e+00	6.4e+00	3.4e-01	5.1e-03	1.4e-01	8.9e-01	1.2e+00
Nb-93m	3.6e-05	5.4e-07	1.4e-05	9.4e-05	1.3e-04	7.1e-06	1.1e-07	2.9e-06	1.9e-05	2.6e-05
Nb-94	3.4e+00	5.1e-02	1.3e+00	8.8e+00	1.3e+01	6.6e-01	1.0e-02	2.7e-01	1.8e+00	2.4e+00
Nb-95	8.3e-01	1.1e-02	3.3e-01	2.2e+00	3.2e+00	1.6e-01	2.2e-03	6.5e-02	4.2e-01	6.3e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.8e-02	0.0e+00	1.3e-02	1.7e-01	2.7e-01	1.1e-02	0.0e+00	2.5e-03	3.3e-02	5.3e-02
Sb-125	1.8e-02	0.0e+00	3.9e-03	5.1e-02	8.2e-02	3.5e-03	0.0e+00	7.7e-04	1.0e-02	1.6e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	9.5e-04	1.0e-05	3.2e-04	2.5e-03	3.8e-03	1.9e-04	2.0e-06	6.3e-05	4.8e-04	7.5e-04
I-129	1.1e-03	1.2e-05	3.7e-04	2.9e-03	4.6e-03	2.2e-04	2.4e-06	7.3e-05	5.7e-04	8.9e-04
I-131	1.6e-02	4.3e-05	2.6e-03	3.8e-02	7.1e-02	3.1e-03	8.7e-06	5.3e-04	7.5e-03	1.4e-02
Cs-134	2.9e-01	1.0e-03	3.9e-02	4.8e-01	1.2e+00	5.8e-02	2.0e-04	7.6e-03	9.4e-02	2.3e-01
Cs-135	1.2e-06	4.4e-09	1.6e-07	2.0e-06	5.0e-06	2.4e-07	8.5e-10	3.2e-08	3.9e-07	9.8e-07
Cs-137	1.1e-01	3.9e-04	1.4e-02	1.8e-01	4.4e-01	2.1e-02	7.6e-05	2.8e-03	3.5e-02	8.7e-02
Ba-133	6.8e-01	1.0e-02	2.7e-01	1.8e+00	2.6e+00	1.3e-01	2.0e-03	5.5e-02	3.6e-01	5.0e-01
Ce-139	1.9e-01	2.8e-03	7.5e-02	4.9e-01	6.9e-01	3.7e-02	5.5e-04	1.5e-02	9.5e-02	1.4e-01
Ce-141	5.3e-02	7.0e-04	2.1e-02	1.4e-01	2.1e-01	1.1e-02	1.4e-04	4.1e-03	2.7e-02	4.1e-02
Ce-144	1.0e-01	1.5e-03	4.1e-02	2.7e-01	3.8e-01	2.0e-02	3.0e-04	8.2e-03	5.3e-02	7.4e-02
Pm-147	1.7e-05	2.5e-07	6.8e-06	4.5e-05	6.3e-05	3.3e-06	5.1e-08	1.4e-06	8.8e-06	1.2e-05

Table F1.56 Normalized effective dose equivalents from external exposure: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.4e-07	5.1e-09	1.4e-07	9.0e-07	1.3e-06	6.7e-08	1.0e-09	2.7e-08	1.8e-07	2.5e-07
Eu-152	2.4e+00	3.8e-02	9.7e-01	6.4e+00	9.0e+00	4.8e-01	7.2e-03	1.9e-01	1.3e+00	1.8e+00
Eu-154	2.6e+00	4.0e-02	1.1e+00	7.0e+00	9.9e+00	5.2e-01	7.9e-03	2.1e-01	1.4e+00	1.9e+00
Eu-155	6.2e-02	9.3e-04	2.5e-02	1.6e-01	2.3e-01	1.2e-02	1.9e-04	5.0e-03	3.3e-02	4.5e-02
Gd-153	7.7e-02	1.1e-03	3.1e-02	2.0e-01	2.9e-01	1.5e-02	2.3e-04	6.2e-03	4.0e-02	5.6e-02
Tb-160	1.7e+00	2.5e-02	6.9e-01	4.5e+00	6.4e+00	3.4e-01	5.0e-03	1.4e-01	8.8e-01	1.3e+00
Tm-170	4.3e-03	6.4e-05	1.7e-03	1.1e-02	1.6e-02	8.5e-04	1.3e-05	3.4e-04	2.2e-03	3.2e-03
Tm-171	3.7e-04	5.6e-06	1.5e-04	9.9e-04	1.4e-03	7.4e-05	1.1e-06	3.0e-05	2.0e-04	2.7e-04
Ta-182	2.2e+00	3.3e-02	9.0e-01	5.8e+00	8.4e+00	4.4e-01	6.6e-03	1.8e-01	1.1e+00	1.6e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.9e+00	5.8e-02	1.6e+00	1.0e+01	1.4e+01	7.7e-01	1.2e-02	3.1e-01	2.0e+00	2.8e+00
Ra-228	2.2e+00	3.3e-02	8.7e-01	5.7e+00	8.1e+00	4.3e-01	6.5e-03	1.7e-01	1.1e+00	1.6e+00
Ac-227	7.0e-01	1.0e-02	2.8e-01	1.8e+00	2.6e+00	1.4e-01	2.1e-03	5.6e-02	3.7e-01	5.1e-01
Th-228	3.4e+00	5.1e-02	1.4e+00	9.0e+00	1.3e+01	6.7e-01	1.0e-02	2.7e-01	1.8e+00	2.5e+00
Th-229	5.5e-01	8.3e-03	2.2e-01	1.4e+00	2.1e+00	1.1e-01	1.6e-03	4.4e-02	2.9e-01	4.0e-01
Th-230	5.9e-04	8.7e-06	2.3e-04	1.5e-03	2.2e-03	1.2e-04	1.7e-06	4.6e-05	3.0e-04	4.2e-04
Th-232	2.6e-02	2.9e-04	8.6e-03	6.8e-02	1.0e-01	5.1e-03	5.8e-05	1.7e-03	1.3e-02	2.0e-02
Pa-231	6.8e-02	1.0e-03	2.7e-02	1.8e-01	2.6e-01	1.3e-02	2.1e-04	5.5e-03	3.6e-02	5.0e-02
U-232	1.2e-01	1.4e-03	4.2e-02	3.3e-01	5.0e-01	2.5e-02	2.8e-04	8.4e-03	6.5e-02	9.8e-02
U-233	4.9e-04	7.4e-06	2.0e-04	1.3e-03	1.8e-03	9.7e-05	1.5e-06	3.9e-05	2.6e-04	3.6e-04
U-234	1.4e-04	2.1e-06	5.6e-05	3.7e-04	5.2e-04	2.8e-05	4.2e-07	1.1e-05	7.3e-05	1.0e-04
U-235	2.6e-01	4.0e-03	1.1e-01	6.9e-01	9.8e-01	5.2e-02	7.9e-04	2.1e-02	1.4e-01	1.9e-01
U-236	7.5e-05	1.1e-06	3.0e-05	2.0e-04	2.8e-04	1.5e-05	2.2e-07	6.0e-06	3.9e-05	5.4e-05
U-238	4.6e-02	6.9e-04	1.8e-02	1.2e-01	1.7e-01	9.1e-03	1.4e-04	3.7e-03	2.4e-02	3.3e-02
Np-237	3.8e-01	5.7e-03	1.5e-01	1.0e+00	1.4e+00	7.5e-02	1.1e-03	3.0e-02	2.0e-01	2.8e-01
Pu-236	1.5e-04	1.9e-06	5.2e-05	3.9e-04	5.8e-04	2.9e-05	3.8e-07	1.0e-05	7.6e-05	1.1e-04
Pu-238	5.3e-05	7.9e-07	2.1e-05	1.4e-04	2.0e-04	1.0e-05	1.6e-07	4.2e-06	2.8e-05	3.8e-05
Pu-239	1.0e-04	1.5e-06	4.1e-05	2.7e-04	3.8e-04	2.0e-05	3.1e-07	8.2e-06	5.4e-05	7.4e-05
Pu-240	5.1e-05	7.7e-07	2.0e-05	1.3e-04	1.9e-04	1.0e-05	1.5e-07	4.1e-06	2.7e-05	3.7e-05
Pu-241	4.4e-06	6.2e-08	1.7e-06	1.2e-05	1.7e-05	8.8e-07	1.2e-08	3.3e-07	2.3e-06	3.3e-06
Pu-242	4.4e-05	6.7e-07	1.8e-05	1.2e-04	1.7e-04	8.8e-06	1.3e-07	3.6e-06	2.3e-05	3.2e-05
Pu-244	7.0e-01	1.1e-02	2.8e-01	1.8e+00	2.6e+00	1.4e-01	2.1e-03	5.6e-02	3.7e-01	5.1e-01
Am-241	1.5e-02	2.3e-04	6.1e-03	4.0e-02	5.6e-02	3.0e-03	4.6e-05	1.2e-03	7.9e-03	1.1e-02
Am-242m	2.3e-02	3.5e-04	9.4e-03	6.1e-02	8.7e-02	4.6e-03	7.0e-05	1.9e-03	1.2e-02	1.7e-02
Am-243	3.1e-01	4.7e-03	1.2e-01	8.2e-01	1.2e+00	6.1e-02	9.3e-04	2.5e-02	1.6e-01	2.3e-01
Cm-242	5.1e-05	7.6e-07	2.1e-05	1.3e-04	1.9e-04	1.0e-05	1.5e-07	4.1e-06	2.6e-05	3.7e-05
Cm-243	2.0e-01	3.0e-03	8.1e-02	5.3e-01	7.5e-01	4.0e-02	6.1e-04	1.6e-02	1.1e-01	1.5e-01
Cm-244	4.4e-05	6.5e-07	1.8e-05	1.1e-04	1.6e-04	8.6e-06	1.3e-07	3.5e-06	2.3e-05	3.2e-05
Cm-245	1.2e-01	1.8e-03	4.7e-02	3.1e-01	4.4e-01	2.3e-02	3.5e-04	9.4e-03	6.2e-02	8.6e-02
Cm-246	4.0e-05	6.1e-07	1.6e-05	1.1e-04	1.5e-04	8.0e-06	1.2e-07	3.2e-06	2.1e-05	2.9e-05
Cm-247	6.5e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00	1.3e-01	1.9e-03	5.2e-02	3.4e-01	4.7e-01
Cm-248	3.1e-05	4.6e-07	1.2e-05	8.0e-05	1.1e-04	6.0e-06	9.1e-08	2.4e-06	1.6e-05	2.2e-05
Bk-249	1.2e-04	1.4e-06	4.1e-05	3.2e-04	4.9e-04	2.4e-05	2.8e-07	8.2e-06	6.3e-05	9.6e-05
Cf-248	4.0e-05	6.1e-07	1.6e-05	1.1e-04	1.5e-04	8.0e-06	1.2e-07	3.2e-06	2.1e-05	2.9e-05
Cf-249	6.4e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00	1.3e-01	1.9e-03	5.2e-02	3.4e-01	4.7e-01
Cf-250	4.1e-05	6.2e-07	1.6e-05	1.1e-04	1.5e-04	8.1e-06	1.2e-07	3.3e-06	2.1e-05	3.0e-05
Cf-251	1.8e-01	2.8e-03	7.3e-02	4.8e-01	6.8e-01	3.6e-02	5.5e-04	1.5e-02	9.6e-02	1.3e-01
Cf-252	6.0e-05	8.9e-07	2.4e-05	1.6e-04	2.2e-04	1.2e-05	1.8e-07	4.8e-06	3.1e-05	4.3e-05
Cf-254	9.0e-08	1.3e-09	3.6e-08	2.4e-07	3.4e-07	1.8e-08	2.6e-10	7.2e-09	4.6e-08	6.6e-08
Es-254	1.8e+00	2.6e-02	7.1e-01	4.7e+00	6.6e+00	3.5e-01	5.3e-03	1.4e-01	9.2e-01	1.3e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.57 Normalized effective dose equivalents from inhalation: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	8.0e-05	7.8e-07	2.3e-05	1.6e-04	2.4e-04	1.2e-05	1.6e-07	4.5e-06	3.2e-05	4.8e-05
P-32	1.9e-05	1.5e-07	5.7e-06	4.6e-05	7.6e-05	3.7e-06	2.9e-08	1.1e-06	9.1e-06	1.5e-05
S-35	3.0e-05	4.1e-07	1.2e-05	7.8e-05	1.2e-04	6.0e-06	8.2e-08	2.3e-06	1.6e-05	2.3e-05
Cl-38	9.8e-05	9.9e-07	3.2e-05	2.6e-04	3.9e-04	1.9e-05	2.0e-07	6.4e-06	5.0e-05	7.8e-05
K-40	1.0e-04	1.3e-06	3.8e-05	2.7e-04	4.0e-04	2.0e-05	2.6e-07	7.6e-06	5.4e-05	7.9e-05
Ca-41	2.4e-05	3.4e-07	9.4e-06	6.3e-05	9.4e-05	4.8e-06	6.7e-08	1.9e-06	1.2e-05	1.8e-05
Ca-45	1.0e-04	1.4e-06	4.0e-05	2.7e-04	3.9e-04	2.0e-05	2.8e-07	8.0e-06	5.3e-05	7.8e-05
Sc-46	4.0e-04	5.4e-06	1.5e-04	1.0e-03	1.5e-03	7.9e-05	1.1e-06	3.1e-05	2.1e-04	3.0e-04
Cr-51	6.3e-07	0.0e+00	1.2e-07	1.8e-06	3.0e-06	1.2e-07	0.0e+00	2.5e-08	3.5e-07	5.8e-07
Mn-53	5.9e-06	1.4e-08	1.6e-06	1.7e-05	2.6e-05	1.2e-06	2.8e-09	3.2e-07	3.4e-06	5.1e-06
Mn-54	7.3e-05	1.7e-07	2.0e-05	2.1e-04	3.2e-04	1.4e-05	3.5e-08	3.9e-06	4.2e-05	6.3e-05
Fe-55	4.4e-07	0.0e+00	1.0e-07	1.3e-06	2.0e-06	8.7e-08	0.0e+00	2.0e-08	2.6e-07	4.0e-07
Fe-59	2.4e-06	0.0e+00	5.6e-07	7.0e-06	1.1e-05	4.6e-07	0.0e+00	1.1e-07	1.4e-06	2.2e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.4e-05	3.2e-07	9.2e-06	6.2e-05	9.2e-05	4.7e-06	6.4e-08	1.8e-06	1.2e-05	1.8e-05
Sr-89	7.3e-05	9.6e-07	2.8e-05	1.9e-04	2.8e-04	1.4e-05	1.9e-07	5.5e-06	3.7e-05	5.5e-05
Sr-90	4.5e-03	6.2e-05	1.7e-03	1.2e-02	1.7e-02	8.9e-04	1.2e-05	3.4e-04	2.3e-03	3.3e-03
Y-91	5.9e-04	7.7e-06	2.2e-04	1.5e-03	2.3e-03	1.2e-04	1.6e-06	4.4e-05	3.0e-04	4.4e-04
Zr-93	1.5e-03	2.1e-05	5.8e-04	3.9e-03	5.9e-03	3.0e-04	4.1e-06	1.2e-04	7.6e-04	1.1e-03
Zr-95	2.4e-04	3.3e-06	9.2e-05	6.2e-04	9.1e-04	4.7e-05	6.5e-07	1.8e-05	1.2e-04	1.8e-04
Nb-93m	5.3e-04	7.3e-06	2.0e-04	1.4e-03	2.0e-03	1.0e-04	1.4e-06	4.0e-05	2.7e-04	3.9e-04
Nb-94	7.5e-03	1.0e-04	2.9e-03	1.9e-02	2.9e-02	1.5e-03	2.0e-05	5.8e-04	3.8e-03	5.6e-03
Nb-95	5.4e-05	6.6e-07	2.0e-05	1.4e-04	2.1e-04	1.1e-05	1.3e-07	3.9e-06	2.7e-05	4.0e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	6.5e-06	0.0e+00	1.3e-06	1.9e-05	3.0e-05	1.3e-06	0.0e+00	2.6e-07	3.7e-06	5.9e-06
Sb-125	5.2e-06	0.0e+00	1.1e-06	1.5e-05	2.4e-05	1.0e-06	0.0e+00	2.1e-07	3.0e-06	4.7e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	7.2e-05	7.2e-07	2.3e-05	1.8e-04	2.9e-04	1.4e-05	1.4e-07	4.5e-06	3.6e-05	5.6e-05
I-129	7.7e-04	7.8e-06	2.5e-04	2.0e-03	3.1e-03	1.5e-04	1.6e-06	4.9e-05	3.9e-04	6.2e-04
I-131	1.3e-05	3.3e-08	2.0e-06	3.0e-05	5.6e-05	2.5e-06	6.7e-09	4.1e-07	5.8e-06	1.1e-05
Cs-134	7.5e-05	2.5e-07	9.6e-06	1.2e-04	3.0e-04	1.5e-05	5.0e-08	1.9e-06	2.4e-05	5.9e-05
Cs-135	7.6e-06	2.6e-08	9.7e-07	1.2e-05	3.0e-05	1.5e-06	5.1e-09	1.9e-07	2.4e-06	6.0e-06
Cs-137	5.3e-05	1.8e-07	6.8e-06	8.6e-05	2.1e-04	1.1e-05	3.6e-08	1.3e-06	1.7e-05	4.2e-05
Ba-133	1.4e-04	1.9e-06	5.4e-05	3.6e-04	5.4e-04	2.8e-05	3.8e-07	1.1e-05	7.1e-05	1.1e-04
Ce-139	1.4e-04	1.9e-06	5.3e-05	3.6e-04	5.2e-04	2.7e-05	3.8e-07	1.1e-05	7.0e-05	1.0e-04
Ce-141	7.9e-05	9.6e-07	2.9e-05	2.0e-04	3.0e-04	1.6e-05	1.9e-07	5.7e-06	4.0e-05	6.0e-05
Ce-144	6.2e-03	8.6e-05	2.4e-03	1.6e-02	2.4e-02	1.2e-03	1.7e-05	4.8e-04	3.1e-03	4.7e-03
Pm-147	8.9e-04	9.6e-06	2.7e-04	1.8e-03	2.7e-03	1.4e-04	1.9e-06	5.3e-05	3.5e-04	5.2e-04

Table F1.57 Normalized effective dose equivalents from inhalation: Slag disposal-municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.4e-04	7.5e-06	2.1e-04	1.4e-03	2.1e-03	1.1e-04	1.5e-06	4.2e-05	2.7e-04	4.1e-04
Eu-152	4.0e-03	5.5e-05	1.5e-03	1.0e-02	1.5e-02	7.9e-04	1.1e-05	3.1e-04	2.0e-03	3.0e-03
Eu-154	5.2e-03	7.1e-05	2.0e-03	1.3e-02	2.0e-02	1.0e-03	1.4e-05	3.9e-04	2.6e-03	3.8e-03
Eu-155	7.4e-04	1.0e-05	2.9e-04	1.9e-03	2.9e-03	1.5e-04	2.0e-06	5.7e-05	3.7e-04	5.5e-04
Gd-153	1.6e-04	2.2e-06	6.0e-05	4.0e-04	5.9e-04	3.1e-05	4.3e-07	1.2e-05	7.9e-05	1.2e-04
Tb-160	3.2e-04	4.3e-06	1.2e-04	8.4e-04	1.2e-03	6.4e-05	8.7e-07	2.5e-05	1.7e-04	2.4e-04
Tm-170	3.9e-04	5.4e-06	1.5e-04	1.0e-03	1.5e-03	7.8e-05	1.1e-06	3.0e-05	2.0e-04	2.9e-04
Tm-171	1.6e-04	2.2e-06	6.1e-05	4.1e-04	6.1e-04	3.2e-05	4.4e-07	1.2e-05	8.1e-05	1.2e-04
Ta-182	6.6e-04	8.9e-06	2.5e-04	1.7e-03	2.5e-03	1.3e-04	1.8e-06	5.0e-05	3.3e-04	4.9e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.6e-01	2.2e-03	6.1e-02	4.0e-01	6.1e-01	3.1e-02	4.3e-04	1.2e-02	7.9e-02	1.2e-01
Ra-228	3.1e-01	3.8e-03	1.1e-01	8.0e-01	1.2e+00	6.0e-02	7.6e-04	2.2e-02	1.6e-01	2.3e-01
Ac-227	2.4e+01	3.3e-01	9.2e+00	6.1e+01	9.2e+01	4.7e+00	6.5e-02	1.8e+00	1.2e+01	1.8e+01
Th-228	6.0e+00	8.3e-02	2.3e+00	1.6e+01	2.3e+01	1.2e+00	1.6e-02	4.6e-01	3.0e+00	4.5e+00
Th-229	3.2e+01	4.4e-01	1.2e+01	8.2e+01	1.2e+02	6.2e+00	8.6e-02	2.4e+00	1.6e+01	2.4e+01
Th-230	4.7e+00	6.6e-02	1.8e+00	1.2e+01	1.8e+01	9.4e-01	1.3e-02	3.6e-01	2.4e+00	3.6e+00
Th-232	2.1e+01	2.9e-01	8.1e+00	5.4e+01	8.0e+01	4.1e+00	5.7e-02	1.6e+00	1.1e+01	1.6e+01
Pa-231	1.6e+01	2.2e-01	6.0e+00	4.0e+01	6.0e+01	3.1e+00	4.3e-02	1.2e+00	7.9e+00	1.2e+01
U-232	1.2e+01	1.7e-01	4.7e+00	3.1e+01	4.7e+01	2.4e+00	3.3e-02	9.3e-01	6.1e+00	9.1e+00
U-233	2.5e+00	3.4e-02	9.5e-01	6.4e+00	9.5e+00	4.9e-01	6.7e-03	1.9e-01	1.2e+00	1.8e+00
U-234	2.4e+00	3.3e-02	9.3e-01	6.2e+00	9.3e+00	4.7e-01	6.6e-03	1.8e-01	1.2e+00	1.8e+00
U-235	2.2e+00	3.1e-02	8.6e-01	5.8e+00	8.6e+00	4.4e-01	6.1e-03	1.7e-01	1.1e+00	1.7e+00
U-236	2.3e+00	3.2e-02	8.8e-01	5.9e+00	8.8e+00	4.5e-01	6.2e-03	1.7e-01	1.1e+00	1.7e+00
U-238	2.2e+00	3.0e-02	8.3e-01	5.6e+00	8.3e+00	4.2e-01	5.8e-03	1.6e-01	1.1e+00	1.6e+00
Np-237	9.8e+00	1.4e-01	3.8e+00	2.5e+01	3.8e+01	1.9e+00	2.7e-02	7.5e-01	4.9e+00	7.3e+00
Pu-236	2.3e+00	3.2e-02	8.9e-01	6.0e+00	8.9e+00	4.6e-01	6.3e-03	1.8e-01	1.2e+00	1.7e+00
Pu-238	5.2e+00	7.3e-02	2.0e+00	1.3e+01	2.0e+01	1.0e+00	1.4e-02	4.0e-01	2.6e+00	3.9e+00
Pu-239	5.6e+00	7.8e-02	2.2e+00	1.4e+01	2.2e+01	1.1e+00	1.5e-02	4.3e-01	2.8e+00	4.2e+00
Pu-240	5.6e+00	7.8e-02	2.2e+00	1.4e+01	2.2e+01	1.1e+00	1.5e-02	4.3e-01	2.8e+00	4.2e+00
Pu-241	9.1e-02	1.3e-03	3.5e-02	2.3e-01	3.5e-01	1.8e-02	2.5e-04	7.0e-03	4.6e-02	6.8e-02
Pu-242	5.3e+00	7.4e-02	2.0e+00	1.4e+01	2.1e+01	1.1e+00	1.5e-02	4.1e-01	2.7e+00	4.0e+00
Pu-244	5.3e+00	7.3e-02	2.0e+00	1.4e+01	2.0e+01	1.0e+00	1.4e-02	4.0e-01	2.7e+00	3.9e+00
Am-241	8.1e+00	1.1e-01	3.1e+00	2.1e+01	3.1e+01	1.6e+00	2.2e-02	6.2e-01	4.1e+00	6.0e+00
Am-242m	8.0e+00	1.1e-01	3.1e+00	2.1e+01	3.1e+01	1.6e+00	2.2e-02	6.1e-01	4.0e+00	6.0e+00
Am-243	8.0e+00	1.1e-01	3.1e+00	2.1e+01	3.1e+01	1.6e+00	2.2e-02	6.1e-01	4.0e+00	6.0e+00
Cm-242	2.7e-01	3.8e-03	1.1e-01	7.1e-01	1.0e+00	5.4e-02	7.5e-04	2.1e-02	1.4e-01	2.1e-01
Cm-243	5.6e+00	7.7e-02	2.1e+00	1.4e+01	2.2e+01	1.1e+00	1.5e-02	4.3e-01	2.8e+00	4.1e+00
Cm-244	4.5e+00	6.2e-02	1.7e+00	1.2e+01	1.7e+01	8.9e-01	1.2e-02	3.4e-01	2.3e+00	3.3e+00
Cm-245	8.3e+00	1.1e-01	3.2e+00	2.1e+01	3.2e+01	1.6e+00	2.3e-02	6.3e-01	4.2e+00	6.2e+00
Cm-246	8.2e+00	1.1e-01	3.2e+00	2.1e+01	3.2e+01	1.6e+00	2.2e-02	6.3e-01	4.1e+00	6.1e+00
Cm-247	7.5e+00	1.0e-01	2.9e+00	1.9e+01	2.9e+01	1.5e+00	2.1e-02	5.8e-01	3.8e+00	5.6e+00
Cm-248	3.0e+01	4.1e-01	1.2e+01	7.8e+01	1.2e+02	5.9e+00	8.2e-02	2.3e+00	1.5e+01	2.2e+01
Bk-249	2.5e-02	3.4e-04	9.5e-03	6.3e-02	9.5e-02	4.9e-03	6.7e-05	1.9e-03	1.2e-02	1.8e-02
Cf-248	8.7e-01	1.2e-02	3.3e-01	2.3e+00	3.3e+00	1.7e-01	2.4e-03	6.7e-02	4.4e-01	6.5e-01
Cf-249	6.9e+00	9.5e-02	2.7e+00	1.8e+01	2.7e+01	1.4e+00	1.9e-02	5.3e-01	3.5e+00	5.1e+00
Cf-250	3.7e+00	5.1e-02	1.4e+00	9.6e+00	1.4e+01	7.3e-01	1.0e-02	2.9e-01	1.9e+00	2.8e+00
Cf-251	7.1e+00	9.7e-02	2.7e+00	1.8e+01	2.7e+01	1.4e+00	1.9e-02	5.4e-01	3.6e+00	5.2e+00
Cf-252	2.8e+00	3.8e-02	1.1e+00	7.2e+00	1.1e+01	5.5e-01	7.6e-03	2.1e-01	1.4e+00	2.1e+00
Cf-254	3.6e+00	4.7e-02	1.4e+00	9.2e+00	1.4e+01	7.0e-01	9.5e-03	2.7e-01	1.8e+00	2.7e+00
Es-254	7.0e-01	9.7e-03	2.7e-01	1.8e+00	2.7e+00	1.4e-01	1.9e-03	5.4e-02	3.6e-01	5.2e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.58 Normalized effective dose equivalents from ingestion: Slag disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e-04	1.8e-06	8.8e-05	8.3e-04	1.3e-03	5.9e-05	3.4e-07	1.7e-05	1.7e-04	2.6e-04
P-32	9.0e-05	3.9e-07	2.1e-05	2.2e-04	3.9e-04	1.8e-05	8.1e-08	4.2e-06	4.3e-05	7.8e-05
S-35	1.8e-05	1.3e-07	5.4e-06	4.9e-05	7.6e-05	3.6e-06	2.5e-08	1.1e-06	9.7e-06	1.5e-05
Cl-36	4.5e-05	2.4e-07	1.2e-05	1.2e-04	1.9e-04	8.9e-06	4.7e-08	2.3e-06	2.3e-05	3.8e-05
K-40	5.0e-04	3.1e-06	1.5e-04	1.4e-03	2.2e-03	9.9e-05	6.2e-07	2.9e-05	2.8e-04	4.4e-04
Ca-41	7.7e-05	5.4e-07	2.3e-05	2.1e-04	3.2e-04	1.5e-05	1.1e-07	4.5e-06	4.1e-05	6.3e-05
Ca-45	1.6e-04	1.2e-06	4.9e-05	4.4e-04	6.9e-04	3.2e-05	2.3e-07	9.7e-06	8.8e-05	1.3e-04
Sc-46	2.9e-04	2.0e-06	8.6e-05	7.8e-04	1.2e-03	5.7e-05	4.0e-07	1.7e-05	1.5e-04	2.4e-04
Cr-51	9.3e-07	0.0e+00	1.3e-07	2.5e-06	4.5e-06	1.8e-07	0.0e+00	2.5e-08	5.0e-07	8.8e-07
Mn-53	4.3e-06	5.5e-09	8.7e-07	1.2e-05	2.0e-05	8.4e-07	1.1e-09	1.7e-07	2.4e-06	4.0e-06
Mn-54	1.0e-04	1.3e-07	2.0e-05	2.9e-04	4.8e-04	2.0e-05	2.5e-08	4.1e-06	5.7e-05	9.4e-05
Fe-55	8.7e-07	0.0e+00	1.1e-07	1.9e-06	3.3e-06	1.3e-07	0.0e+00	2.1e-08	3.8e-07	6.4e-07
Fe-59	4.5e-06	0.0e+00	7.0e-07	1.2e-05	2.1e-05	8.8e-07	0.0e+00	1.4e-07	2.5e-06	4.2e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	8.2e-05	5.6e-07	2.4e-05	2.2e-04	3.4e-04	1.6e-05	1.1e-07	4.8e-06	4.3e-05	6.6e-05
Sr-89	3.5e-04	2.4e-06	1.0e-04	9.3e-04	1.4e-03	6.8e-05	4.6e-07	2.0e-05	1.8e-04	2.8e-04
Sr-90	9.2e-03	6.5e-05	2.8e-03	2.5e-02	3.9e-02	1.8e-03	1.3e-05	5.4e-04	4.9e-03	7.6e-03
Y-91	3.8e-04	2.6e-06	1.1e-04	1.0e-03	1.6e-03	7.5e-05	5.1e-07	2.2e-05	2.0e-04	3.1e-04
Zr-93	1.0e-04	7.1e-07	3.0e-05	2.7e-04	4.2e-04	2.0e-05	1.4e-07	5.9e-06	5.4e-05	8.2e-05
Zr-95	2.2e-04	1.5e-06	6.5e-05	5.9e-04	9.1e-04	4.3e-05	3.0e-07	1.3e-05	1.2e-04	1.8e-04
Nb-93m	3.1e-05	2.2e-07	9.4e-06	8.5e-05	1.3e-04	6.2e-06	4.4e-08	1.8e-06	1.7e-05	2.6e-05
Nb-94	4.3e-04	3.1e-06	1.3e-04	1.2e-03	1.8e-03	8.5e-05	6.0e-07	2.5e-05	2.3e-04	3.5e-04
Nb-95	7.9e-05	5.1e-07	2.3e-05	2.1e-04	3.3e-04	1.6e-05	1.0e-07	4.6e-06	4.1e-05	6.4e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	8.8e-06	0.0e+00	1.3e-06	2.5e-05	4.4e-05	1.7e-06	0.0e+00	2.5e-07	4.8e-06	8.5e-06
Sb-125	4.6e-06	0.0e+00	6.5e-07	1.3e-05	2.3e-05	9.0e-07	0.0e+00	1.3e-07	2.5e-06	4.5e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.8e-04	2.0e-06	9.6e-05	1.0e-03	1.7e-03	7.5e-05	3.9e-07	1.9e-05	2.0e-04	3.3e-04
I-129	4.1e-03	2.2e-05	1.0e-03	1.1e-02	1.7e-02	8.1e-04	4.3e-06	2.1e-04	2.1e-03	3.5e-03
I-131	6.7e-05	1.1e-07	8.7e-06	1.6e-04	3.0e-04	1.3e-05	2.2e-08	1.7e-06	3.1e-05	6.1e-05
Cs-134	3.9e-04	7.5e-07	4.1e-05	8.2e-04	1.5e-03	7.7e-05	1.4e-07	8.1e-06	1.2e-04	2.9e-04
Cs-135	3.9e-05	7.4e-08	4.0e-06	8.2e-05	1.5e-04	7.7e-06	1.5e-08	8.1e-07	1.2e-05	2.9e-05
Cs-137	2.7e-04	5.2e-07	2.9e-05	4.4e-04	1.0e-03	5.4e-05	1.0e-07	5.7e-06	8.6e-05	2.0e-04
Ba-133	2.0e-04	1.4e-06	8.1e-05	5.5e-04	8.5e-04	4.0e-05	2.9e-07	1.2e-05	1.1e-04	1.7e-04
Ce-139	5.8e-05	4.0e-07	1.7e-05	1.6e-04	2.4e-04	1.1e-05	7.9e-08	3.4e-06	3.1e-05	4.7e-05
Ce-141	8.5e-05	5.4e-07	2.5e-05	2.2e-04	3.5e-04	1.7e-05	1.1e-07	4.9e-06	4.4e-05	6.9e-05
Ce-144	1.2e-03	8.3e-06	3.5e-04	3.1e-03	4.9e-03	2.3e-04	1.6e-06	6.9e-05	6.3e-04	9.6e-04
Pm-147	8.1e-05	4.3e-07	1.8e-05	1.7e-04	2.6e-04	1.2e-05	8.6e-08	3.6e-06	3.3e-05	5.1e-05

Table F1.58 Normalized effective dose equivalents from ingestion: Slag disposal-municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.3e-05	1.6e-07	7.0e-06	6.3e-05	9.7e-05	4.6e-06	3.3e-08	1.4e-06	1.3e-05	1.9e-05
Eu-152	3.9e-04	2.7e-06	1.2e-04	1.0e-03	1.6e-03	7.7e-05	5.4e-07	2.8e-05	2.1e-04	3.2e-04
Eu-154	5.7e-04	4.0e-06	1.7e-04	1.5e-03	2.4e-03	1.1e-04	8.0e-07	3.4e-05	3.1e-04	4.7e-04
Eu-155	9.1e-05	6.4e-07	2.7e-05	2.4e-04	3.8e-04	1.8e-05	1.3e-07	5.4e-06	4.9e-05	7.4e-05
Gd-153	6.4e-05	4.5e-07	1.9e-05	1.7e-04	2.7e-04	1.3e-05	8.9e-08	3.8e-06	3.4e-05	5.2e-05
Tb-160	2.9e-04	2.0e-06	8.6e-05	7.7e-04	1.2e-03	5.7e-05	4.0e-07	1.7e-05	1.5e-04	2.4e-04
Tm-170	2.6e-04	1.8e-06	7.9e-05	7.2e-04	1.1e-03	5.2e-05	3.6e-07	1.6e-05	1.4e-04	2.2e-04
Tm-171	2.5e-05	1.8e-07	7.5e-06	6.7e-05	1.0e-04	4.9e-06	3.5e-08	1.5e-06	1.3e-05	2.1e-05
Ta-182	3.2e-04	2.2e-06	9.5e-05	8.6e-04	1.3e-03	6.3e-05	4.4e-07	1.9e-05	1.7e-04	2.6e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	8.1e-02	5.7e-04	2.4e-02	2.2e-01	3.4e-01	1.6e-02	1.1e-04	4.7e-03	4.4e-02	6.7e-02
Ra-228	8.7e-02	6.1e-04	2.6e-02	2.4e-01	3.6e-01	1.7e-02	1.2e-04	5.1e-03	4.7e-02	7.2e-02
Ac-227	8.9e-01	6.2e-03	2.7e-01	2.4e+00	3.7e+00	1.8e-01	1.2e-03	5.2e-02	4.8e-01	7.3e-01
Th-228	4.7e-02	3.3e-04	1.4e-02	1.3e-01	2.0e-01	9.3e-03	6.6e-05	2.8e-03	2.5e-02	3.9e-02
Th-229	2.4e-01	1.7e-03	7.3e-02	6.5e-01	1.0e+00	4.8e-02	3.4e-04	1.4e-02	1.3e-01	2.0e-01
Th-230	3.3e-02	2.3e-04	9.9e-03	8.9e-02	1.4e-01	6.5e-03	4.6e-05	1.9e-03	1.8e-02	2.7e-02
Th-232	1.7e-01	1.2e-03	5.0e-02	4.5e-01	6.9e-01	3.3e-02	2.3e-04	9.7e-03	8.9e-02	1.4e-01
Pa-231	6.4e-01	4.5e-03	1.9e-01	1.7e+00	2.7e+00	1.3e-01	8.9e-04	3.8e-02	3.5e-01	5.3e-01
U-232	5.9e-03	4.0e-05	1.7e-03	1.6e-02	2.4e-02	1.2e-03	8.0e-06	3.4e-04	3.2e-03	4.8e-03
U-233	1.6e-03	1.1e-05	4.8e-04	4.3e-03	6.7e-03	3.2e-04	2.2e-06	9.4e-05	8.6e-04	1.3e-03
U-234	1.6e-03	1.1e-05	4.7e-04	4.2e-03	6.6e-03	3.1e-04	2.2e-06	9.3e-05	8.5e-04	1.3e-03
U-235	1.7e-03	1.2e-05	5.1e-04	4.6e-03	7.1e-03	3.3e-04	2.4e-06	1.0e-04	9.1e-04	1.4e-03
U-236	1.5e-03	1.1e-05	4.5e-04	4.0e-03	6.2e-03	2.9e-04	2.1e-06	8.8e-05	8.0e-04	1.2e-03
U-238	2.3e-03	1.6e-05	6.8e-04	6.1e-03	9.4e-03	4.5e-04	3.2e-06	1.3e-04	1.2e-03	1.9e-03
Np-237	2.7e-01	1.9e-03	8.0e-02	7.2e-01	1.1e+00	5.3e-02	3.8e-04	1.6e-02	1.4e-01	2.2e-01
Pu-236	6.9e-02	4.8e-04	2.1e-02	1.8e-01	2.9e-01	1.4e-02	9.6e-05	4.0e-03	3.7e-02	5.6e-02
Pu-238	1.9e-01	1.4e-03	5.8e-02	5.2e-01	8.1e-01	3.8e-02	2.7e-04	1.1e-02	1.0e-01	1.6e-01
Pu-239	2.1e-01	1.5e-03	6.4e-02	5.8e-01	8.9e-01	4.2e-02	3.0e-04	1.3e-02	1.1e-01	1.8e-01
Pu-240	2.1e-01	1.5e-03	6.4e-02	5.8e-01	8.9e-01	4.2e-02	3.0e-04	1.3e-02	1.1e-01	1.8e-01
Pu-241	4.1e-03	2.9e-05	1.2e-03	1.1e-02	1.7e-02	8.2e-04	5.8e-06	2.4e-04	2.2e-03	3.4e-03
Pu-242	2.0e-01	1.4e-03	6.1e-02	5.5e-01	8.5e-01	4.0e-02	2.8e-04	1.2e-02	1.1e-01	1.7e-01
Pu-244	2.0e-01	1.4e-03	6.0e-02	5.4e-01	8.4e-01	4.0e-02	2.8e-04	1.2e-02	1.1e-01	1.6e-01
Am-241	2.2e-01	1.6e-03	6.6e-02	5.9e-01	9.2e-01	4.3e-02	3.1e-04	1.3e-02	1.2e-01	1.8e-01
Am-242m	2.2e-01	1.5e-03	6.5e-02	5.9e-01	9.1e-01	4.3e-02	3.0e-04	1.3e-02	1.2e-01	1.8e-01
Am-243	2.2e-01	1.5e-03	6.8e-02	5.9e-01	9.1e-01	4.3e-02	3.1e-04	1.3e-02	1.2e-01	1.8e-01
Cm-242	6.1e-03	4.3e-05	1.8e-03	1.7e-02	2.5e-02	1.2e-03	8.4e-06	3.6e-04	3.3e-03	5.0e-03
Cm-243	1.5e-01	1.1e-03	4.5e-02	4.1e-01	6.3e-01	3.0e-02	2.1e-04	8.9e-03	8.1e-02	1.2e-01
Cm-244	1.2e-01	8.6e-04	3.6e-02	3.3e-01	5.1e-01	2.4e-02	1.7e-04	7.1e-03	6.5e-02	1.0e-01
Cm-245	2.3e-01	1.6e-03	6.8e-02	6.1e-01	9.4e-01	4.4e-02	3.2e-04	1.3e-02	1.2e-01	1.9e-01
Cm-246	2.2e-01	1.6e-03	6.7e-02	6.0e-01	9.3e-01	4.4e-02	3.1e-04	1.3e-02	1.2e-01	1.8e-01
Cm-247	2.1e-01	1.5e-03	6.2e-02	5.5e-01	8.6e-01	4.1e-02	2.9e-04	1.2e-02	1.1e-01	1.7e-01
Cm-248	8.2e-01	5.8e-03	2.5e-01	2.2e+00	3.4e+00	1.6e-01	1.1e-03	4.8e-02	4.4e-01	6.8e-01
Bk-249	7.2e-04	5.1e-06	2.2e-04	1.9e-03	3.0e-03	1.4e-04	1.0e-06	4.2e-05	3.9e-04	5.9e-04
Cf-248	1.9e-02	1.4e-04	5.8e-03	5.1e-02	8.0e-02	3.8e-03	2.7e-05	1.1e-03	1.0e-02	1.6e-02
Cf-249	2.9e-01	2.0e-03	8.6e-02	7.7e-01	1.2e+00	5.6e-02	4.0e-04	1.7e-02	1.5e-01	2.4e-01
Cf-250	1.3e-01	9.1e-04	3.8e-02	3.4e-01	5.3e-01	2.5e-02	1.8e-04	7.5e-03	6.9e-02	1.1e-01
Cf-251	2.9e-01	2.1e-03	8.8e-02	7.9e-01	1.2e+00	5.8e-02	4.1e-04	1.7e-02	1.6e-01	2.4e-01
Cf-252	6.4e-02	4.5e-04	1.9e-02	1.7e-01	2.7e-01	1.3e-02	8.9e-05	3.7e-03	3.4e-02	5.3e-02
Cf-254	9.8e-02	6.7e-04	2.9e-02	2.6e-01	4.1e-01	1.9e-02	1.3e-04	5.6e-03	5.1e-02	7.9e-02
Es-254	1.6e-02	1.3e-04	5.4e-03	4.8e-02	7.5e-02	3.5e-03	2.5e-05	1.1e-03	9.7e-03	1.5e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.59 Normalized effective dose equivalents from all pathways: Scrap disposal–Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	3.3e-05	1.8e-06	1.4e-05	8.9e-05	1.4e-04	6.5e-06	3.6e-07	2.8e-06	1.8e-05	2.7e-05
Na-22	3.4e+01	1.8e+00	1.5e+01	9.0e+01	1.4e+02	6.6e+00	3.7e-01	2.9e+00	1.8e+01	2.8e+01
P-32	2.3e-02	1.2e-03	1.0e-02	6.3e-02	9.7e-02	4.6e-03	2.5e-04	2.0e-03	1.2e-02	1.9e-02
S-35	3.5e-05	1.9e-06	1.5e-05	9.5e-05	1.5e-04	7.0e-06	3.9e-07	3.0e-06	1.9e-05	2.9e-05
Cl-36	5.9e-03	3.2e-04	2.5e-03	1.6e-02	2.4e-02	1.2e-03	6.4e-05	5.0e-04	3.2e-03	4.8e-03
K-40	2.6e+00	1.4e-01	1.1e+00	6.9e+00	1.1e+01	5.0e-01	2.8e-02	2.2e-01	1.4e+00	2.1e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.5e-04	8.1e-06	6.5e-05	4.1e-04	6.3e-04	3.0e-05	1.6e-06	1.3e-05	8.1e-05	1.2e-04
Sc-46	3.0e+01	1.6e+00	1.3e+01	8.1e+01	1.3e+02	5.9e+00	3.3e-01	2.6e+00	1.6e+01	2.5e+01
Cr-51	3.8e-01	2.1e-02	1.7e-01	1.0e+00	1.6e+00	7.6e-02	4.2e-03	3.3e-02	2.1e-01	3.2e-01
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.3e+01	6.8e-01	5.4e+00	3.4e+01	5.2e+01	2.5e+00	1.4e-01	1.1e+00	6.8e+00	1.0e+01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.8e+01	9.4e-01	7.6e+00	4.7e+01	7.3e+01	3.5e+00	1.9e-01	1.5e+00	9.4e+00	1.4e+01
Co-56	5.6e+01	3.0e+00	2.4e+01	1.5e+02	2.3e+02	1.1e+01	6.1e-01	4.8e+00	3.0e+01	4.6e+01
Co-57	1.2e+00	6.5e-02	5.3e-01	3.3e+00	5.1e+00	2.4e-01	1.3e-02	1.0e-01	6.5e-01	1.0e+00
Co-58	1.4e+01	7.5e-01	6.1e+00	3.8e+01	5.9e+01	2.8e+00	1.5e-01	1.2e+00	7.5e+00	1.2e+01
Co-60	4.0e+01	2.1e+00	1.7e+01	1.1e+02	1.7e+02	7.8e+00	4.3e-01	3.4e+00	2.1e+01	3.3e+01
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	9.0e+00	4.8e-01	3.9e+00	2.4e+01	3.7e+01	1.8e+00	9.8e-02	7.7e-01	4.8e+00	7.4e+00
As-73	2.2e-02	1.2e-03	9.6e-03	6.0e-02	9.3e-02	4.4e-03	2.4e-04	1.9e-03	1.2e-02	1.8e-02
Se-75	4.7e+00	2.5e-01	2.1e+00	1.3e+01	2.0e+01	9.4e-01	5.2e-02	4.1e-01	2.6e+00	3.9e+00
Sr-85	7.0e+00	3.7e-01	3.0e+00	1.9e+01	2.9e+01	1.4e+00	7.6e-02	6.0e-01	3.8e+00	5.7e+00
Sr-89	2.1e-02	1.1e-03	9.1e-03	5.6e-02	8.8e-02	4.1e-03	2.3e-04	1.8e-03	1.1e-02	1.7e-02
Sr-90	6.1e-02	3.3e-03	2.6e-02	1.6e-01	2.5e-01	1.2e-02	6.6e-04	5.2e-03	3.2e-02	5.0e-02
Y-91	7.6e-02	4.1e-03	3.3e-02	2.0e-01	3.2e-01	1.5e-02	8.2e-04	6.5e-03	4.1e-02	6.2e-02
Zr-93	1.3e-07	5.5e-09	5.1e-08	3.3e-07	5.3e-07	2.5e-08	1.1e-09	1.0e-08	6.5e-08	1.1e-07
Zr-95	1.2e+01	6.2e-01	5.0e+00	3.1e+01	4.8e+01	2.3e+00	1.3e-01	9.8e-01	6.2e+00	9.5e+00
Nb-93m	2.6e-04	1.4e-05	1.1e-04	6.9e-04	1.1e-03	5.0e-05	2.8e-06	2.2e-05	1.4e-04	2.1e-04
Nb-94	2.4e+01	1.3e+00	1.0e+01	6.4e+01	9.9e+01	4.7e+00	2.6e-01	2.0e+00	1.3e+01	2.0e+01
Nb-95	1.1e+01	5.7e-01	4.6e+00	2.8e+01	4.4e+01	2.1e+00	1.1e-01	9.1e-01	5.7e+00	8.7e+00
Mo-93	1.5e-03	7.8e-05	6.3e-04	3.9e-03	6.0e-03	2.9e-04	1.6e-05	1.2e-04	7.8e-04	1.2e-03
Tc-97	2.0e-03	1.1e-04	8.6e-04	5.4e-03	8.3e-03	3.9e-04	2.2e-05	1.7e-04	1.1e-03	1.6e-03
Tc-97m	4.5e-03	2.4e-04	2.0e-03	1.2e-02	1.9e-02	8.9e-04	4.9e-05	3.9e-04	2.4e-03	3.7e-03
Tc-99	3.1e-04	1.7e-05	1.3e-04	8.3e-04	1.3e-03	6.1e-05	3.4e-06	2.6e-05	1.7e-04	2.5e-04
Ru-103	6.2e+00	3.4e-01	2.7e+00	1.7e+01	2.6e+01	1.2e+00	6.8e-02	5.4e-01	3.4e+00	5.1e+00
Ru-106	3.2e+00	1.7e-01	1.4e+00	8.5e+00	1.3e+01	6.2e-01	3.4e-02	2.7e-01	1.7e+00	2.6e+00
Ag-108m	2.4e+01	1.3e+00	1.0e+01	6.4e+01	9.9e+01	4.7e+00	2.6e-01	2.0e+00	1.3e+01	2.0e+01
Ag-110m	4.2e+01	2.2e+00	1.8e+01	1.1e+02	1.7e+02	8.2e+00	4.6e-01	3.6e+00	2.2e+01	3.4e+01
Cd-109	8.5e-02	3.5e-03	2.8e-02	1.7e-01	2.7e-01	1.3e-02	7.1e-04	5.5e-03	3.5e-02	5.3e-02
Sn-113	3.5e+00	1.9e-01	1.5e+00	9.4e+00	1.5e+01	6.9e-01	3.8e-02	3.0e-01	1.9e+00	2.9e+00
Sb-124	2.7e+01	1.5e+00	1.2e+01	7.3e+01	1.1e+02	5.4e+00	3.0e-01	2.3e+00	1.5e+01	2.2e+01
Sb-125	8.0e+00	3.2e-01	2.8e+00	1.6e+01	2.5e+01	1.2e+00	6.6e-02	5.1e-01	3.2e+00	5.0e+00
Te-123m	1.5e+00	8.1e-02	6.5e-01	4.1e+00	6.3e+00	3.0e-01	1.6e-02	1.3e-01	8.1e-01	1.2e+00
Te-127m	8.0e-02	4.3e-03	3.5e-02	2.1e-01	3.3e-01	1.6e-02	8.7e-04	6.8e-03	4.3e-02	6.5e-02
I-125	3.9e-02	2.1e-03	1.7e-02	1.0e-01	1.6e-01	7.6e-03	4.2e-04	3.3e-03	2.1e-02	3.2e-02
I-129	3.2e-02	1.7e-03	1.4e-02	8.6e-02	1.3e-01	6.3e-03	3.5e-04	2.7e-03	1.7e-02	2.6e-02
I-131	3.7e+00	1.9e-01	1.6e+00	9.7e+00	1.5e+01	7.2e-01	3.9e-02	3.1e-01	1.9e+00	3.0e+00
Cs-134	2.3e+01	1.2e+00	1.0e+01	6.2e+01	9.6e+01	4.6e+00	2.5e-01	2.0e+00	1.2e+01	1.9e+01
Cs-135	9.4e-05	5.1e-06	4.1e-05	2.5e-04	3.9e-04	1.9e-05	1.0e-06	8.0e-06	5.0e-05	7.8e-05
Cs-137	8.4e+00	4.5e-01	3.6e+00	2.3e+01	3.5e+01	1.6e+00	9.1e-02	7.1e-01	4.5e+00	6.9e+00
Ba-133	4.9e+00	2.6e-01	2.1e+00	1.3e+01	2.0e+01	9.6e-01	5.3e-02	4.1e-01	2.6e+00	4.0e+00
Ce-139	1.5e+00	8.2e-02	6.6e-01	4.1e+00	6.4e+00	3.0e-01	1.7e-02	1.3e-01	8.2e-01	1.3e+00
Ce-141	7.1e-01	3.8e-02	3.1e-01	1.9e+00	3.0e+00	1.4e-01	7.7e-03	6.1e-02	3.8e-01	5.8e-01
Ce-144	7.8e-01	4.2e-02	3.4e-01	2.1e+00	3.2e+00	1.5e-01	8.5e-03	6.7e-02	4.2e-01	6.4e-01
Pm-147	1.2e-04	6.6e-06	5.3e-05	3.3e-04	5.1e-04	2.4e-05	1.3e-06	1.0e-05	6.6e-05	1.0e-04

Table F1.59 Normalized effective dose equivalents from all pathways: Scrap disposal-Industrial

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.4e-06	1.3e-07	1.0e-06	6.5e-06	1.0e-05	4.8e-07	2.6e-08	2.1e-07	1.3e-06	2.0e-06
Eu-152	1.7e+01	9.3e-01	7.5e+00	4.6e+01	7.2e+01	3.4e+00	1.9e-01	1.5e+00	9.2e+00	1.4e+01
Eu-154	1.9e+01	1.0e+00	8.2e+00	5.1e+01	7.8e+01	3.7e+00	2.1e-01	1.6e+00	1.0e+01	1.6e+01
Eu-155	4.5e-01	2.4e-02	1.9e-01	1.2e+00	1.9e+00	8.8e-02	4.9e-03	3.8e-02	2.4e-01	3.7e-01
Gd-153	5.9e-01	3.2e-02	2.6e-01	1.6e+00	2.5e+00	1.2e-01	6.5e-03	5.1e-02	3.2e-01	4.9e-01
Tb-160	1.6e+01	8.8e-01	7.0e+00	4.4e+01	6.8e+01	3.2e+00	1.8e-01	1.4e+00	8.8e+00	1.3e+01
Tm-170	3.6e-02	1.9e-03	1.6e-02	9.7e-02	1.5e-01	7.1e-03	3.9e-04	3.1e-03	1.9e-02	2.9e-02
Tm-171	2.7e-03	1.5e-04	1.2e-03	7.4e-03	1.1e-02	5.4e-04	3.0e-05	2.3e-04	1.5e-03	2.3e-03
Ta-182	1.9e+01	1.0e+00	8.2e+00	5.1e+01	7.9e+01	3.7e+00	2.1e-01	1.6e+00	1.0e+01	1.6e+01
W-181	1.8e-01	9.8e-03	7.9e-02	4.9e-01	7.6e-01	3.6e-02	2.0e-03	1.6e-02	9.8e-02	1.5e-01
W-185	1.0e-03	5.5e-05	4.4e-04	2.8e-03	4.3e-03	2.0e-04	1.1e-05	8.8e-05	5.5e-04	8.4e-04
Os-185	9.9e+00	5.3e-01	4.3e+00	2.7e+01	4.1e+01	2.0e+00	1.1e-01	8.5e-01	5.3e+00	8.1e+00
Ir-192	1.1e+01	5.9e-01	4.7e+00	2.9e+01	4.5e+01	2.1e+00	1.2e-01	9.3e-01	5.9e+00	8.9e+00
Tl-204	1.0e-02	5.3e-04	4.3e-03	2.7e-02	4.1e-02	2.0e-03	1.1e-04	8.5e-04	5.3e-03	8.2e-03
Pb-210	1.5e-02	8.1e-04	6.5e-03	4.0e-02	6.2e-02	3.0e-03	1.6e-04	1.3e-03	8.0e-03	1.2e-02
Bi-207	2.3e+01	1.2e+00	1.0e+01	6.2e+01	9.6e+01	4.5e+00	2.5e-01	2.0e+00	1.2e+01	1.9e+01
Po-210	1.3e-04	6.8e-06	5.4e-05	3.4e-04	5.2e-04	2.5e-05	1.4e-06	1.1e-05	6.8e-05	1.0e-04
Ra-226	2.8e+01	1.5e+00	1.2e+01	7.4e+01	1.1e+02	5.4e+00	3.0e-01	2.3e+00	1.5e+01	2.3e+01
Ra-228	1.5e+01	8.0e-01	6.4e+00	4.0e+01	6.1e+01	2.9e+00	1.6e-01	1.3e+00	7.9e+00	1.2e+01
Ac-227	4.9e+00	2.7e-01	2.1e+00	1.3e+01	2.1e+01	9.7e-01	5.4e-02	4.2e-01	2.7e+00	4.1e+00
Th-228	2.5e+01	1.3e+00	1.1e+01	6.7e+01	1.0e+02	4.9e+00	2.7e-01	2.1e+00	1.3e+01	2.1e+01
Th-229	3.9e+00	2.1e-01	1.7e+00	1.1e+01	1.6e+01	7.7e-01	4.3e-02	3.3e-01	2.1e+00	3.2e+00
Th-230	3.1e-03	1.7e-04	1.4e-03	8.4e-03	1.3e-02	6.1e-04	3.4e-05	2.7e-04	1.7e-03	2.5e-03
Th-232	2.3e-02	1.0e-03	9.2e-03	6.0e-02	9.6e-02	4.6e-03	2.0e-04	1.8e-03	1.2e-02	1.9e-02
Pa-231	4.7e-01	2.5e-02	2.0e-01	1.3e+00	2.0e+00	9.3e-02	5.1e-03	4.0e-02	2.5e-01	3.9e-01
U-232	1.1e-01	6.0e-03	4.5e-02	2.9e-01	4.7e-01	2.2e-02	9.8e-04	8.8e-03	5.8e-02	9.5e-02
U-233	3.4e-03	1.9e-04	1.5e-03	9.3e-03	1.4e-02	6.8e-04	3.8e-05	2.9e-04	1.8e-03	2.8e-03
U-234	9.9e-04	5.3e-05	4.3e-04	2.7e-03	4.1e-03	1.9e-04	1.1e-05	8.4e-05	5.3e-04	8.1e-04
U-235	1.9e+00	1.0e-01	8.1e-01	5.0e+00	7.7e+00	3.7e-01	2.0e-02	1.6e-01	1.0e+00	1.5e+00
U-236	5.3e-04	2.8e-05	2.3e-04	1.4e-03	2.2e-03	1.0e-04	5.8e-06	4.5e-05	2.8e-04	4.4e-04
U-238	3.3e-01	1.8e-02	1.4e-01	8.8e-01	1.4e+00	6.4e-02	3.6e-03	2.8e-02	1.7e-01	2.7e-01
Np-237	2.7e+00	1.5e-01	1.2e+00	7.3e+00	1.1e+01	5.3e-01	2.9e-02	2.3e-01	1.4e+00	2.2e+00
Pu-236	5.7e-04	3.1e-05	2.5e-04	1.5e-03	2.4e-03	1.1e-04	6.2e-06	4.8e-05	3.0e-04	4.6e-04
Pu-238	3.7e-04	2.0e-05	1.6e-04	1.0e-03	1.5e-03	7.3e-05	4.1e-06	3.2e-05	2.0e-04	3.1e-04
Pu-239	7.3e-04	3.9e-05	3.1e-04	2.0e-03	3.0e-03	1.4e-04	7.9e-06	6.2e-05	3.9e-04	6.0e-04
Pu-240	3.6e-04	1.9e-05	1.6e-04	9.7e-04	1.5e-03	7.1e-05	3.9e-06	3.1e-05	1.9e-04	3.0e-04
Pu-241	1.7e-05	8.9e-07	7.2e-06	4.5e-05	6.9e-05	3.3e-06	1.8e-07	1.4e-06	8.9e-06	1.4e-05
Pu-242	3.1e-04	1.7e-05	1.4e-04	8.5e-04	1.3e-03	6.2e-05	3.4e-06	2.7e-05	1.7e-04	2.6e-04
Pu-244	5.0e+00	2.7e-01	2.2e+00	1.3e+01	2.1e+01	9.8e-01	5.4e-02	4.2e-01	2.7e+00	4.1e+00
Am-241	1.1e-01	5.8e-03	4.7e-02	2.9e-01	4.5e-01	2.1e-02	1.2e-03	9.2e-03	5.8e-02	8.9e-02
Am-242m	1.7e-01	8.9e-03	7.2e-02	4.5e-01	6.9e-01	3.3e-02	1.8e-03	1.4e-02	8.9e-02	1.4e-01
Am-243	2.2e+00	1.2e-01	9.5e-01	5.9e+00	9.1e+00	4.3e-01	2.4e-02	1.9e-01	1.2e+00	1.8e+00
Cm-242	4.1e-04	2.2e-05	1.8e-04	1.1e-03	1.7e-03	8.1e-05	4.5e-06	3.5e-05	2.2e-04	3.4e-04
Cm-243	1.4e+00	7.7e-02	6.2e-01	3.9e+00	6.0e+00	2.8e-01	1.6e-02	1.2e-01	7.7e-01	1.2e+00
Cm-244	3.1e-04	1.7e-05	1.3e-04	8.3e-04	1.3e-03	6.1e-05	3.4e-06	2.6e-05	1.7e-04	2.6e-04
Cm-245	8.4e-01	4.5e-02	3.6e-01	2.3e+00	3.5e+00	1.6e-01	9.1e-03	7.1e-02	4.5e-01	6.9e-01
Cm-246	2.9e-04	1.5e-05	1.2e-04	7.7e-04	1.2e-03	5.6e-05	3.1e-06	2.4e-05	1.5e-04	2.4e-04
Cm-247	4.6e+00	2.5e-01	2.0e+00	1.2e+01	1.9e+01	9.0e-01	5.0e-02	3.9e-01	2.5e+00	3.8e+00
Cm-248	2.2e-04	1.2e-05	9.4e-05	5.8e-04	9.0e-04	4.3e-05	2.4e-06	1.8e-05	1.2e-04	1.8e-04
Bk-249	1.2e-04	5.5e-06	4.8e-05	3.1e-04	5.1e-04	2.4e-05	1.1e-06	9.5e-06	6.1e-05	1.0e-04
Cf-248	3.0e-04	1.6e-05	1.3e-04	8.2e-04	1.3e-03	6.0e-05	3.3e-06	2.6e-05	1.6e-04	2.5e-04
Cf-249	4.6e+00	2.4e-01	2.0e+00	1.2e+01	1.9e+01	9.0e-01	5.0e-02	3.9e-01	2.4e+00	3.8e+00
Cf-250	2.9e-04	1.6e-05	1.3e-04	7.8e-04	1.2e-03	5.7e-05	3.2e-06	2.5e-05	1.6e-04	2.4e-04
Cf-251	1.3e+00	7.0e-02	5.6e-01	3.5e+00	5.4e+00	2.6e-01	1.4e-02	1.1e-01	6.9e-01	1.1e+00
Cf-252	4.3e-04	2.3e-05	1.9e-04	1.2e-03	1.8e-03	8.5e-05	4.7e-06	3.7e-05	2.3e-04	3.6e-04
Cf-254	9.0e-07	4.9e-08	3.9e-07	2.4e-06	3.8e-06	1.8e-07	9.8e-09	7.7e-08	4.9e-07	7.4e-07
Es-254	1.4e+01	7.3e-01	5.9e+00	3.6e+01	5.6e+01	2.7e+00	1.5e-01	1.2e+00	7.3e+00	1.1e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.60 Normalized effective dose equivalents from all pathways: Scrap disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.1e-05	1.0e-07	3.3e-06	2.5e-05	4.3e-05	2.2e-06	2.0e-08	6.5e-07	5.1e-06	8.7e-06
Na-22	1.1e+01	1.0e-01	3.3e+00	2.6e+01	4.4e+01	2.2e+00	2.1e-02	6.5e-01	5.1e+00	8.8e+00
P-32	8.0e-03	7.2e-05	2.3e-03	1.8e-02	3.1e-02	1.6e-03	1.4e-05	4.6e-04	3.6e-03	6.1e-03
S-35	1.2e-05	1.1e-07	3.5e-06	2.7e-05	4.6e-05	2.4e-06	2.2e-08	6.9e-07	5.4e-06	9.2e-06
Cl-36	2.0e-03	1.8e-05	5.9e-04	4.5e-03	7.7e-03	3.9e-04	3.6e-06	1.1e-04	9.0e-04	1.5e-03
K-40	8.7e-01	8.0e-03	2.6e-01	2.0e+00	3.3e+00	1.7e-01	1.6e-03	5.0e-02	3.9e-01	6.7e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	5.1e-05	4.7e-07	1.5e-05	1.2e-04	2.0e-04	1.0e-05	9.3e-08	2.9e-06	2.3e-05	3.9e-05
Sc-46	1.0e+01	9.4e-02	3.0e+00	2.3e+01	3.9e+01	2.0e+00	1.9e-02	5.9e-01	4.6e+00	7.8e+00
Cr-51	1.3e-01	1.2e-03	3.8e-02	3.0e-01	5.0e-01	2.6e-02	2.4e-04	7.5e-03	5.9e-02	1.0e-01
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.3e+00	3.9e-02	1.3e+00	9.6e+00	1.6e+01	8.4e-01	7.7e-03	2.5e-01	1.9e+00	3.3e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	6.0e+00	5.5e-02	1.7e+00	1.4e+01	2.3e+01	1.2e+00	1.1e-02	3.4e-01	2.7e+00	4.6e+00
Co-56	1.9e+01	1.7e-01	5.5e+00	4.3e+01	7.3e+01	3.7e+00	3.4e-02	1.1e+00	8.6e+00	1.4e+01
Co-57	4.1e-01	3.8e-03	1.2e-01	9.4e-01	1.6e+00	8.2e-02	7.5e-04	2.4e-02	1.9e-01	3.2e-01
Co-58	4.8e+00	4.4e-02	1.4e+00	1.1e+01	1.8e+01	9.4e-01	8.7e-03	2.7e-01	2.2e+00	3.6e+00
Co-60	1.4e+01	1.2e-01	4.0e+00	3.1e+01	5.2e+01	2.7e+00	2.5e-02	7.8e-01	6.1e+00	1.0e+01
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	3.1e+00	2.8e-02	9.0e-01	6.9e+00	1.2e+01	6.0e-01	5.5e-03	1.8e-01	1.4e+00	2.4e+00
As-73	7.6e-03	6.9e-05	2.2e-03	1.7e-02	2.9e-02	1.5e-03	1.4e-05	4.3e-04	3.4e-03	5.8e-03
Se-75	1.6e+00	1.5e-02	4.7e-01	3.6e+00	6.2e+00	3.2e-01	2.9e-03	9.3e-02	7.3e-01	1.2e+00
Sr-85	2.4e+00	2.2e-02	6.9e-01	5.4e+00	9.1e+00	4.7e-01	4.3e-03	1.4e-01	1.1e+00	1.8e+00
Sr-89	7.2e-03	6.5e-05	2.1e-03	1.6e-02	2.7e-02	1.4e-03	1.3e-05	4.1e-04	3.2e-03	5.5e-03
Sr-90	2.1e-02	1.9e-04	6.0e-03	4.6e-02	7.9e-02	4.1e-03	3.7e-05	1.2e-03	9.3e-03	1.6e-02
Y-91	2.6e-02	2.4e-04	7.6e-03	5.9e-02	9.9e-02	5.1e-03	4.7e-05	1.5e-03	1.2e-02	2.0e-02
Zr-93	4.3e-08	3.5e-10	1.2e-08	1.0e-07	1.7e-07	8.4e-09	6.8e-11	2.4e-09	2.0e-08	3.2e-08
Zr-95	3.9e+00	3.6e-02	1.2e+00	8.9e+00	1.5e+01	7.7e-01	7.1e-03	2.3e-01	1.8e+00	3.0e+00
Nb-93m	8.7e-05	8.0e-07	2.5e-05	2.0e-04	3.3e-04	1.7e-05	1.6e-07	5.0e-06	3.9e-05	6.7e-05
Nb-94	8.1e+00	7.4e-02	2.4e+00	1.8e+01	3.1e+01	1.6e+00	1.5e-02	4.7e-01	3.7e+00	6.2e+00
Nb-95	3.6e+00	3.3e-02	1.1e+00	8.2e+00	1.4e+01	7.1e-01	6.5e-03	2.1e-01	1.6e+00	2.8e+00
Mo-93	4.9e-04	4.5e-06	1.4e-04	1.1e-03	1.9e-03	9.7e-05	8.9e-07	2.8e-05	2.2e-04	3.8e-04
Tc-97	6.8e-04	6.2e-06	2.0e-04	1.5e-03	2.6e-03	1.3e-04	1.2e-06	3.9e-05	3.1e-04	5.2e-04
Tc-97m	1.5e-03	1.4e-05	4.5e-04	3.5e-03	5.9e-03	3.0e-04	2.8e-06	8.8e-05	7.0e-04	1.2e-03
Tc-99	1.1e-04	9.6e-07	3.1e-05	2.4e-04	4.0e-04	2.1e-05	1.9e-07	6.0e-06	4.7e-05	8.1e-05
Ru-103	2.1e+00	1.9e-02	6.2e-01	4.8e+00	8.2e+00	4.2e-01	3.9e-03	1.2e-01	9.6e-01	1.6e+00
Ru-106	1.1e+00	9.8e-03	3.1e-01	2.4e+00	4.1e+00	2.1e-01	1.9e-03	6.1e-02	4.8e-01	8.3e-01
Ag-108m	8.1e+00	7.4e-02	2.4e+00	1.8e+01	3.1e+01	1.6e+00	1.5e-02	4.6e-01	3.6e+00	6.2e+00
Ag-110m	1.4e+01	1.3e-01	4.2e+00	3.2e+01	5.4e+01	2.8e+00	2.6e-02	8.1e-01	6.4e+00	1.1e+01
Cd-109	2.2e-02	2.0e-04	6.5e-03	5.0e-02	8.5e-02	4.3e-03	4.0e-05	1.3e-03	1.0e-02	1.7e-02
Sn-113	1.2e+00	1.1e-02	3.5e-01	2.7e+00	4.6e+00	2.4e-01	2.2e-03	6.8e-02	5.4e-01	9.1e-01
Sb-124	9.3e+00	8.5e-02	2.7e+00	2.1e+01	3.6e+01	1.8e+00	1.7e-02	5.3e-01	4.2e+00	7.1e+00
Sb-125	2.0e+00	1.9e-02	6.0e-01	4.6e+00	7.8e+00	4.0e-01	3.7e-03	1.2e-01	9.2e-01	1.6e+00
Te-123m	5.1e-01	4.7e-03	1.5e-01	1.2e+00	2.0e+00	1.0e-01	9.3e-04	2.9e-02	2.3e-01	3.9e-01
Te-127m	2.7e-02	2.5e-04	7.9e-03	6.1e-02	1.0e-01	5.3e-03	4.9e-05	1.6e-03	1.2e-02	2.1e-02
I-125	1.3e-02	1.2e-04	3.9e-03	3.0e-02	5.1e-02	2.6e-03	2.4e-05	7.5e-04	6.0e-03	1.0e-02
I-129	1.1e-02	9.9e-05	3.2e-03	2.4e-02	4.2e-02	2.1e-03	2.0e-05	6.2e-04	4.9e-03	8.3e-03
I-131	1.3e+00	1.1e-02	3.6e-01	2.9e+00	4.8e+00	2.6e-01	2.2e-03	7.0e-02	5.7e-01	9.6e-01
Cs-134	7.9e+00	7.2e-02	2.3e+00	1.8e+01	3.0e+01	1.6e+00	1.4e-02	4.5e-01	3.6e+00	6.1e+00
Cs-135	3.2e-05	2.9e-07	9.4e-06	7.2e-05	1.2e-04	6.3e-06	5.8e-08	1.8e-06	1.4e-05	2.5e-05
Cs-137	2.8e+00	2.6e-02	8.3e-01	6.4e+00	1.1e+01	5.6e-01	5.2e-03	1.6e-01	1.3e+00	2.2e+00
Ba-133	1.7e+00	1.5e-02	4.8e-01	3.7e+00	6.4e+00	3.3e-01	3.0e-03	9.5e-02	7.5e-01	1.3e+00
Ce-139	5.2e-01	4.8e-03	1.5e-01	1.2e+00	2.0e+00	1.0e-01	9.5e-04	3.0e-02	2.4e-01	4.0e-01
Ce-141	2.4e-01	2.2e-03	7.1e-02	5.5e-01	9.3e-01	4.8e-02	4.4e-04	1.4e-02	1.1e-01	1.9e-01
Ce-144	2.7e-01	2.4e-03	7.8e-02	6.0e-01	1.0e+00	5.2e-02	4.8e-04	1.5e-02	1.2e-01	2.0e-01
Pm-147	4.2e-05	3.8e-07	1.2e-05	9.4e-05	1.6e-04	8.2e-06	7.6e-08	2.4e-06	1.9e-05	3.2e-05

Table F1.60 Normalized effective dose equivalents from all pathways: Scrap disposal–municipal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.2e-07	7.5e-09	2.4e-07	1.9e-06	3.2e-06	1.6e-07	1.5e-09	4.7e-08	3.7e-07	6.3e-07
Eu-152	5.9e+00	5.4e-02	1.7e+00	1.3e+01	2.2e+01	1.2e+00	1.1e-02	3.4e-01	2.6e+00	4.5e+00
Eu-154	6.4e+00	5.9e-02	1.9e+00	1.4e+01	2.5e+01	1.3e+00	1.2e-02	3.7e-01	2.9e+00	4.9e+00
Eu-155	1.5e-01	1.4e-03	4.5e-02	3.4e-01	5.8e-01	3.0e-02	2.8e-04	8.7e-03	6.9e-02	1.2e-01
Gd-153	2.0e-01	1.8e-03	5.9e-02	4.6e-01	7.8e-01	4.0e-02	3.7e-04	1.2e-02	9.1e-02	1.6e-01
Tb-160	5.5e+00	5.1e-02	1.6e+00	1.3e+01	2.1e+01	1.1e+00	1.0e-02	3.2e-01	2.5e+00	4.2e+00
Tm-170	1.2e-02	1.1e-04	3.6e-03	2.8e-02	4.1e-02	2.4e-03	2.2e-05	7.0e-04	5.5e-03	9.4e-03
Tm-171	9.3e-04	8.5e-06	2.7e-04	2.1e-03	3.6e-03	1.8e-04	1.7e-06	5.3e-05	4.2e-04	7.2e-04
Ta-182	6.5e+00	5.9e-02	1.9e+00	1.5e+01	2.5e+01	1.3e+00	1.2e-02	3.7e-01	2.9e+00	5.0e+00
W-181	6.2e-02	5.7e-04	1.8e-02	1.4e-01	2.4e-01	1.2e-02	1.1e-04	3.6e-03	2.8e-02	4.8e-02
W-185	3.5e-04	3.2e-06	1.0e-04	7.9e-04	1.3e-03	6.9e-05	6.3e-07	2.0e-05	1.6e-04	2.7e-04
Os-185	3.4e+00	3.1e-02	9.9e-01	7.8e+00	1.3e+01	6.7e-01	6.1e-03	1.9e-01	1.5e+00	2.6e+00
Ir-192	3.7e+00	3.4e-02	1.1e+00	8.4e+00	1.4e+01	7.3e-01	6.7e-03	2.1e-01	1.7e+00	2.8e+00
Tl-204	3.4e-03	3.1e-05	9.9e-04	7.6e-03	1.3e-02	6.7e-04	6.1e-06	1.9e-04	1.5e-03	2.6e-03
Pb-210	5.1e-03	4.7e-05	1.5e-03	1.2e-02	2.0e-02	1.0e-03	9.2e-06	2.9e-04	2.3e-03	3.9e-03
Bi-207	7.8e+00	7.2e-02	2.3e+00	1.8e+01	3.0e+01	1.5e+00	1.4e-02	4.5e-01	3.5e+00	6.0e+00
Po-210	4.3e-05	3.9e-07	1.3e-05	9.7e-05	1.6e-04	8.4e-06	7.8e-08	2.5e-06	1.9e-05	3.3e-05
Ra-226	9.4e+00	8.6e-02	2.7e+00	2.1e+01	3.6e+01	1.8e+00	1.7e-02	5.4e-01	4.2e+00	7.2e+00
Ra-228	5.0e+00	4.6e-02	1.5e+00	1.1e+01	1.9e+01	9.9e-01	9.1e-03	2.9e-01	2.3e+00	3.9e+00
Ac-227	1.7e+00	1.5e-02	4.9e-01	3.8e+00	6.5e+00	3.3e-01	3.0e-03	9.7e-02	7.6e-01	1.3e+00
Th-228	8.5e+00	7.8e-02	2.5e+00	1.9e+01	3.3e+01	1.7e+00	1.5e-02	4.9e-01	3.8e+00	6.5e+00
Th-229	1.3e+00	1.2e-02	3.9e-01	3.0e+00	5.1e+00	2.6e-01	2.4e-03	7.6e-02	6.0e-01	1.0e+00
Th-230	1.1e-03	9.7e-06	3.1e-04	2.4e-03	4.1e-03	2.1e-04	1.9e-06	6.1e-05	4.8e-04	8.1e-04
Th-232	7.7e-03	6.3e-05	2.2e-03	1.6e-02	3.0e-02	1.5e-03	1.3e-05	4.3e-04	3.5e-03	5.8e-03
Pa-231	1.6e-01	1.5e-03	4.7e-02	3.6e-01	6.1e-01	3.2e-02	2.9e-04	9.2e-03	7.2e-02	1.2e-01
U-232	3.8e-02	3.1e-04	1.1e-02	8.8e-02	1.5e-01	7.4e-03	6.1e-05	2.1e-03	1.7e-02	2.9e-02
U-233	1.2e-03	1.1e-05	3.4e-04	2.6e-03	4.5e-03	2.3e-04	2.1e-06	6.7e-05	5.3e-04	9.0e-04
U-234	3.4e-04	3.1e-06	9.8e-05	7.6e-04	1.3e-03	6.6e-05	6.1e-07	1.9e-05	1.5e-04	2.6e-04
U-235	6.3e-01	5.8e-03	1.9e-01	1.4e+00	2.4e+00	1.2e-01	1.1e-03	3.6e-02	2.9e-01	4.9e-01
U-236	1.8e-04	1.6e-06	5.3e-05	4.0e-04	6.9e-04	3.5e-05	3.3e-07	1.0e-05	8.1e-05	1.4e-04
U-238	1.1e-01	1.0e-03	3.2e-02	2.5e-01	4.3e-01	2.2e-02	2.0e-04	6.4e-03	5.0e-02	8.5e-02
Np-237	9.2e-01	8.4e-03	2.7e-01	2.1e+00	3.5e+00	1.8e-01	1.7e-03	5.3e-02	4.1e-01	7.1e-01
Pu-236	1.9e-04	1.8e-06	5.6e-05	4.4e-04	7.4e-04	3.8e-05	3.5e-07	1.1e-05	8.7e-05	1.5e-04
Pu-238	1.3e-04	1.2e-06	3.7e-05	2.9e-04	4.9e-04	2.5e-05	2.3e-07	7.3e-06	5.7e-05	9.7e-05
Pu-239	2.5e-04	2.3e-06	7.2e-05	5.6e-04	9.5e-04	4.9e-05	4.5e-07	1.4e-05	1.1e-04	1.9e-04
Pu-240	1.2e-04	1.1e-06	3.6e-05	2.8e-04	4.7e-04	2.4e-05	2.2e-07	7.1e-06	5.5e-05	9.4e-05
Pu-241	5.8e-06	5.2e-08	1.6e-06	1.3e-05	2.2e-05	1.1e-06	1.0e-08	3.2e-07	2.5e-06	4.4e-06
Pu-242	1.1e-04	9.8e-07	3.1e-05	2.4e-04	4.1e-04	2.1e-05	1.9e-07	6.2e-06	4.8e-05	8.2e-05
Pu-244	1.7e+00	1.6e-02	5.0e-01	3.8e+00	6.5e+00	3.3e-01	3.1e-03	9.8e-02	7.7e-01	1.3e+00
Am-241	3.7e-02	3.3e-04	1.1e-02	8.2e-02	1.4e-01	7.2e-03	6.6e-05	2.1e-03	1.6e-02	2.8e-02
Am-242m	5.6e-02	5.1e-04	1.6e-02	1.3e-01	2.2e-01	1.1e-02	1.0e-04	3.2e-03	2.5e-02	4.3e-02
Am-243	7.5e-01	6.8e-03	2.2e-01	1.7e+00	2.9e+00	1.5e-01	1.4e-03	4.5e-02	3.4e-01	5.8e-01
Cm-242	1.4e-04	1.3e-06	4.1e-05	3.2e-04	5.4e-04	2.8e-05	2.5e-07	8.0e-06	6.3e-05	1.1e-04
Cm-243	4.9e-01	4.5e-03	1.4e-01	1.1e+00	1.9e+00	9.6e-02	8.8e-04	2.8e-02	2.2e-01	3.7e-01
Cm-244	1.1e-04	9.6e-07	3.1e-05	2.4e-04	4.0e-04	2.1e-05	1.9e-07	6.1e-06	4.7e-05	8.1e-05
Cm-245	2.8e-01	2.6e-03	8.3e-02	6.4e-01	1.1e+00	5.6e-02	5.1e-04	1.6e-02	1.3e-01	2.2e-01
Cm-246	9.7e-05	8.9e-07	2.9e-05	2.2e-04	3.7e-04	1.9e-05	1.8e-07	5.8e-06	4.4e-05	7.5e-05
Cm-247	1.6e+00	1.4e-02	4.6e-01	3.5e+00	6.0e+00	3.1e-01	2.8e-03	8.9e-02	7.0e-01	1.2e+00
Cm-248	7.3e-05	6.7e-07	2.2e-05	1.7e-04	2.8e-04	1.4e-05	1.3e-07	4.2e-06	3.3e-05	5.6e-05
Bk-249	4.0e-05	3.4e-07	1.2e-05	9.4e-05	1.6e-04	8.0e-06	6.6e-08	2.3e-06	1.9e-05	3.0e-05
Cf-248	1.0e-04	9.4e-07	3.0e-05	2.3e-04	4.0e-04	2.0e-05	1.9e-07	5.9e-06	4.7e-05	8.0e-05
Cf-249	1.5e+00	1.4e-02	4.5e-01	3.5e+00	5.9e+00	3.1e-01	2.8e-03	8.9e-02	7.0e-01	1.2e+00
Cf-250	9.9e-05	9.1e-07	2.9e-05	2.2e-04	3.8e-04	2.0e-05	1.8e-07	5.7e-06	4.5e-05	7.6e-05
Cf-251	4.4e-01	4.0e-03	1.3e-01	9.9e-01	1.7e+00	8.7e-02	8.0e-04	2.5e-02	2.0e-01	3.4e-01
Cf-252	1.5e-04	1.3e-06	4.3e-05	3.3e-04	5.6e-04	2.9e-05	2.7e-07	8.4e-06	6.6e-05	1.1e-04
Cf-254	3.1e-07	2.8e-09	9.0e-08	7.0e-07	1.2e-06	6.1e-08	5.6e-10	1.8e-08	1.4e-07	2.4e-07
Es-254	4.5e+00	4.2e-02	1.3e+00	1.0e+01	1.8e+01	9.1e-01	8.3e-03	2.6e-01	2.1e+00	3.5e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.61 Normalized effective dose equivalents from all pathways: EAF dust disposal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e+00	4.7e-01	2.1e+00	6.6e+00	8.0e+00	5.8e-01	9.3e-02	4.2e-01	1.3e+00	1.6e+00
P-32	3.0e-05	1.8e-06	1.5e-05	7.9e-05	1.1e-04	5.9e-06	3.5e-07	2.9e-06	1.5e-05	2.2e-05
S-35	1.5e-07	2.0e-08	1.0e-07	3.3e-07	4.2e-07	2.9e-08	4.0e-09	2.0e-08	6.6e-08	8.2e-08
Cl-36	2.5e-04	2.8e-05	1.6e-04	5.8e-04	8.0e-04	5.0e-05	5.5e-06	3.2e-05	1.2e-04	1.6e-04
K-40	2.3e-01	3.7e-02	1.7e-01	5.2e-01	6.2e-01	4.6e-02	7.3e-03	3.3e-02	1.0e-01	1.2e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.2e-06	1.7e-07	8.1e-07	2.6e-06	3.3e-06	2.3e-07	3.4e-08	1.6e-07	5.1e-07	6.3e-07
Sc-46	2.0e-01	2.9e-02	1.4e-01	4.5e-01	5.6e-01	3.9e-02	5.7e-03	2.7e-02	8.8e-02	1.1e-01
Cr-51	7.1e-04	7.5e-05	4.3e-04	1.7e-03	2.3e-03	1.4e-04	1.5e-05	8.7e-05	3.3e-04	4.5e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	7.6e-02	1.2e-02	5.5e-02	1.7e-01	2.1e-01	1.5e-02	2.4e-03	1.1e-02	3.3e-02	4.0e-02
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	2.4e-02	3.0e-03	1.6e-02	5.5e-02	7.0e-02	4.7e-03	6.0e-04	3.1e-03	1.1e-02	1.4e-02
Co-58	9.6e-02	1.2e-02	6.5e-02	2.2e-01	2.8e-01	1.9e-02	2.5e-03	1.3e-02	4.3e-02	5.4e-02
Co-57	2.6e-03	3.5e-04	1.8e-03	6.0e-03	7.5e-03	5.2e-04	7.0e-05	3.6e-04	1.2e-03	1.5e-03
Co-58	2.3e-02	3.0e-03	1.6e-02	5.3e-02	6.7e-02	4.6e-03	6.0e-04	3.1e-03	1.0e-02	1.3e-02
Co-60	9.3e-02	1.3e-02	6.4e-02	2.1e-01	2.7e-01	1.8e-02	2.5e-03	1.3e-02	4.2e-02	5.2e-02
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	1.4e+00	2.2e-01	9.8e-01	3.0e+00	3.6e+00	2.7e-01	4.3e-02	2.0e-01	5.9e-01	7.1e-01
As-73	1.0e-03	1.4e-04	7.2e-04	2.3e-03	2.9e-03	2.0e-04	2.8e-05	1.4e-04	4.6e-04	5.8e-04
Se-75	8.7e-01	1.0e-01	4.8e-01	1.5e+00	1.8e+00	1.3e-01	2.1e-02	9.6e-02	2.9e-01	3.5e-01
Sr-85	4.3e-02	6.0e-03	2.9e-02	9.7e-02	1.2e-01	8.4e-03	1.2e-03	5.7e-03	1.9e-02	2.4e-02
Sr-89	1.2e-04	1.6e-05	7.7e-05	2.6e-04	3.3e-04	2.3e-05	3.1e-06	1.5e-05	5.1e-05	6.6e-05
Sr-90	5.4e-04	8.2e-05	3.8e-04	1.2e-03	1.5e-03	1.1e-04	1.6e-05	7.4e-05	2.4e-04	3.0e-04
Y-91	4.4e-04	6.1e-05	3.1e-04	1.0e-03	1.3e-03	8.8e-05	1.3e-05	6.1e-05	2.0e-04	2.5e-04
Zr-93	1.1e-08	1.2e-09	7.0e-09	2.5e-08	3.3e-08	2.1e-09	2.5e-10	1.4e-09	5.0e-09	6.6e-09
Zr-95	1.1e-01	1.6e-02	7.5e-02	2.4e-01	3.0e-01	2.1e-02	3.1e-03	1.5e-02	4.7e-02	5.8e-02
Nb-93m	2.3e-06	3.3e-07	1.6e-06	5.0e-06	6.2e-06	4.5e-07	6.6e-08	3.1e-07	9.9e-07	1.2e-06
Nb-94	2.1e-01	3.1e-02	1.5e-01	4.7e-01	5.8e-01	4.2e-02	6.2e-03	2.9e-02	9.2e-02	1.1e-01
Nb-95	4.7e-02	5.7e-03	3.1e-02	1.1e-01	1.4e-01	9.3e-03	1.2e-03	6.1e-03	2.1e-02	2.7e-02
Mo-93	3.5e-06	4.8e-07	2.4e-06	7.8e-06	9.8e-06	6.8e-07	9.5e-08	4.8e-07	1.5e-06	1.9e-06
Tc-97	4.7e-06	6.7e-07	3.3e-06	1.1e-05	1.4e-05	9.3e-07	1.3e-07	6.5e-07	2.1e-06	2.7e-06
Tc-97m	8.0e-06	1.1e-06	5.6e-06	1.9e-05	2.3e-05	1.6e-06	2.2e-07	1.1e-06	3.6e-06	4.6e-06
Tc-99	7.4e-07	1.0e-07	5.2e-07	1.7e-06	2.1e-06	1.4e-07	2.0e-08	1.0e-07	3.3e-07	4.1e-07
Ru-103	8.0e-03	9.7e-04	5.2e-03	1.8e-02	2.4e-02	1.6e-03	1.9e-04	1.0e-03	3.6e-03	4.7e-03
Ru-106	7.0e-03	9.9e-04	4.9e-03	1.6e-02	2.0e-02	1.4e-03	2.0e-04	9.7e-04	3.1e-03	3.9e-03
Ag-108m	6.7e-01	8.0e-02	4.4e-01	1.6e+00	2.0e+00	1.3e-01	1.6e-02	8.7e-02	3.1e-01	3.9e-01
Ag-110m	1.1e+00	1.3e-01	6.9e-01	2.5e+00	3.2e+00	2.1e-01	2.5e-02	1.4e-01	4.9e-01	6.2e-01
Cd-109	1.1e-02	1.8e-03	8.0e-03	2.5e-02	3.0e-02	2.2e-03	3.5e-04	1.6e-03	4.8e-03	5.8e-03
Sn-113	8.7e-03	9.2e-04	4.6e-03	1.5e-02	1.9e-02	1.3e-03	1.9e-04	9.0e-04	3.0e-03	3.7e-03
Sb-124	4.1e-01	4.7e-02	2.7e-01	9.6e-01	1.2e+00	8.1e-02	9.2e-03	5.2e-02	1.9e-01	2.4e-01
Sb-125	1.3e-01	1.6e-02	8.8e-02	3.1e-01	3.9e-01	2.6e-02	3.3e-03	1.7e-02	6.0e-02	7.7e-02
Te-123m	2.1e-01	3.3e-02	1.5e-01	4.7e-01	5.7e-01	4.2e-02	6.6e-03	3.0e-02	9.3e-02	1.1e-01
Te-127m	1.1e-02	1.7e-03	7.9e-03	2.5e-02	2.9e-02	2.2e-03	3.4e-04	1.6e-03	4.8e-03	5.7e-03
I-125	1.1e-03	1.0e-04	6.7e-04	2.7e-03	3.4e-03	2.2e-04	2.1e-05	1.4e-04	5.2e-04	6.8e-04
I-129	1.4e-03	1.4e-04	8.7e-04	3.3e-03	4.3e-03	2.7e-04	2.8e-05	1.7e-04	6.5e-04	8.4e-04
I-131	1.5e-02	1.8e-04	3.6e-03	4.1e-02	7.2e-02	3.0e-03	3.5e-05	7.1e-04	8.2e-03	1.4e-02
Cs-134	4.0e+00	6.4e-01	2.9e+00	8.8e+00	1.1e+01	7.8e-01	1.3e-01	5.7e-01	1.7e+00	2.1e+00
Cs-135	1.7e-05	2.7e-06	1.2e-05	3.7e-05	4.5e-05	3.3e-06	5.3e-07	2.4e-06	7.2e-06	8.7e-06
Cs-137	1.5e+00	2.4e-01	1.1e+00	3.3e+00	4.0e+00	2.9e-01	4.7e-02	2.1e-01	6.4e-01	7.8e-01
Ba-133	4.3e-02	6.5e-03	3.1e-02	9.6e-02	1.2e-01	8.5e-03	1.3e-03	6.1e-03	1.9e-02	2.3e-02
Ce-139	1.1e-02	1.7e-03	8.0e-03	2.5e-02	3.2e-02	2.2e-03	3.4e-04	1.6e-03	5.0e-03	6.2e-03
Ce-141	3.0e-03	3.6e-04	2.0e-03	7.1e-03	9.0e-03	6.0e-04	7.3e-05	3.9e-04	1.4e-03	1.8e-03
Ce-144	6.4e-03	9.5e-04	4.5e-03	1.4e-02	1.8e-02	1.3e-03	1.9e-04	9.0e-04	2.8e-03	3.4e-03
Pm-147	1.1e-06	1.6e-07	7.6e-07	2.4e-06	3.0e-06	2.1e-07	3.2e-08	1.5e-07	4.7e-07	5.8e-07

Table F1.61 Normalized effective dose equivalents from all pathways: EAF dust disposal

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.2e-08	3.2e-09	1.5e-08	4.8e-08	6.1e-08	4.3e-09	6.3e-10	3.0e-09	9.5e-09	1.2e-08
Eu-152	1.5e-01	2.2e-02	1.1e-01	3.4e-01	4.2e-01	3.0e-02	4.5e-03	2.1e-02	6.7e-02	8.3e-02
Eu-154	1.7e-01	2.4e-02	1.2e-01	3.7e-01	4.6e-01	3.3e-02	4.9e-03	2.3e-02	7.4e-02	9.1e-02
Eu-155	3.9e-03	5.7e-04	2.8e-03	8.8e-03	1.1e-02	7.7e-04	1.1e-04	5.5e-04	1.7e-03	2.1e-03
Gd-153	4.8e-03	7.2e-04	3.4e-03	1.1e-02	1.3e-02	9.4e-04	1.4e-04	6.8e-04	2.1e-03	2.6e-03
Tb-160	1.0e-01	1.4e-02	7.1e-02	2.3e-01	2.9e-01	2.0e-02	2.8e-03	1.4e-02	4.5e-02	5.6e-02
Tm-170	2.6e-04	3.8e-05	1.9e-04	5.9e-04	7.3e-04	5.2e-05	7.6e-06	3.7e-05	1.1e-04	1.4e-04
Tm-171	2.4e-05	3.4e-06	1.7e-05	5.3e-05	6.5e-05	4.6e-06	6.9e-07	3.3e-06	1.0e-05	1.3e-05
Ta-182	1.4e-01	2.0e-02	9.4e-02	3.0e-01	3.8e-01	2.7e-02	3.9e-03	1.9e-02	6.0e-02	7.3e-02
W-181	3.5e-04	4.8e-05	2.4e-04	8.0e-04	1.0e-03	6.9e-05	9.6e-06	4.8e-05	1.6e-04	2.0e-04
W-185	1.7e-06	2.3e-07	1.2e-06	4.0e-06	5.1e-06	3.4e-07	4.6e-08	2.3e-07	7.8e-07	9.9e-07
Os-185	1.3e+00	2.1e-01	9.5e-01	3.0e+00	3.5e+00	2.6e-01	4.0e-02	1.9e-01	5.8e-01	6.9e-01
Ir-192	1.8e-02	2.5e-03	1.2e-02	4.2e-02	5.3e-02	3.6e-03	5.0e-04	2.5e-03	8.3e-03	1.1e-02
Tl-204	1.7e-03	2.7e-04	1.2e-03	3.8e-03	4.6e-03	3.4e-04	5.4e-05	2.5e-04	7.4e-04	8.9e-04
Pb-210	2.6e-03	4.2e-04	1.9e-03	5.8e-03	7.0e-03	5.2e-04	8.3e-05	3.8e-04	1.1e-03	1.4e-03
Bi-207	4.0e+00	6.5e-01	2.9e+00	8.9e+00	1.1e+01	7.9e-01	1.3e-01	5.8e-01	1.8e+00	2.1e+00
Po-210	1.8e-05	2.9e-06	1.3e-05	4.1e-05	4.9e-05	3.6e-06	5.7e-07	2.6e-06	8.0e-06	9.5e-06
Ra-226	2.5e-01	3.7e-02	1.8e-01	5.5e-01	6.9e-01	4.9e-02	7.3e-03	3.5e-02	1.1e-01	1.4e-01
Ra-228	1.4e-01	2.1e-02	9.9e-02	3.1e-01	3.9e-01	2.7e-02	4.1e-03	1.9e-02	6.2e-02	7.6e-02
Ac-227	4.4e-02	6.4e-03	3.1e-02	9.8e-02	1.2e-01	8.7e-03	1.3e-03	6.1e-03	1.9e-02	2.4e-02
Th-228	2.1e-01	3.2e-02	1.5e-01	4.8e-01	5.8e-01	4.2e-02	6.3e-03	3.0e-02	9.4e-02	1.1e-01
Th-229	3.5e-02	5.2e-03	2.5e-02	7.8e-02	9.5e-02	6.9e-03	1.0e-03	4.9e-03	1.5e-02	1.8e-02
Th-230	3.9e-05	5.7e-06	2.7e-05	8.7e-05	1.1e-04	7.7e-06	1.1e-06	5.4e-06	1.7e-05	2.1e-05
Th-232	1.9e-03	2.1e-04	1.2e-03	4.5e-03	5.9e-03	3.8e-04	4.3e-05	2.4e-04	8.8e-04	1.2e-03
Pa-231	4.4e-03	6.5e-04	3.0e-03	9.7e-03	1.2e-02	8.6e-04	1.3e-04	6.0e-04	1.9e-03	2.3e-03
U-232	9.2e-03	1.1e-03	6.0e-03	2.1e-02	2.8e-02	1.8e-03	2.2e-04	1.2e-03	4.2e-03	5.5e-03
U-233	3.1e-05	4.6e-06	2.2e-05	6.8e-05	8.6e-05	6.1e-06	9.3e-07	4.4e-06	1.3e-05	1.7e-05
U-234	8.9e-06	1.3e-06	6.3e-06	1.9e-05	2.5e-05	1.7e-06	2.6e-07	1.3e-06	3.8e-06	4.8e-06
U-235	1.7e-02	2.5e-03	1.2e-02	3.7e-02	4.6e-02	3.3e-03	5.0e-04	2.4e-03	7.2e-03	9.0e-03
U-236	4.7e-06	7.0e-07	3.4e-06	1.0e-05	1.3e-05	9.3e-07	1.4e-07	6.7e-07	2.1e-06	2.6e-06
U-238	2.9e-03	4.3e-04	2.1e-03	6.4e-03	8.1e-03	5.7e-04	8.7e-05	4.1e-04	1.3e-03	1.6e-03
Np-237	2.4e-02	3.6e-03	1.7e-02	5.3e-02	6.7e-02	4.7e-03	7.1e-04	3.4e-03	1.1e-02	1.3e-02
Pu-236	1.1e-05	1.3e-06	7.2e-06	2.6e-05	3.4e-05	2.2e-06	2.7e-07	1.4e-06	5.0e-06	6.7e-06
Pu-238	3.3e-06	5.0e-07	2.3e-06	7.5e-06	9.4e-06	6.5e-07	9.9e-08	4.6e-07	1.5e-06	1.8e-06
Pu-239	6.5e-06	9.8e-07	4.5e-06	1.5e-05	1.8e-05	1.3e-06	1.9e-07	8.9e-07	2.9e-06	3.6e-06
Pu-240	3.2e-06	4.9e-07	2.2e-06	7.3e-06	9.1e-06	6.4e-07	9.6e-08	4.4e-07	1.4e-06	1.8e-06
Pu-241	3.1e-07	4.3e-08	2.1e-07	7.0e-07	8.9e-07	6.1e-08	8.6e-09	4.1e-08	1.4e-07	1.8e-07
Pu-242	2.8e-06	4.2e-07	2.0e-06	6.3e-06	7.9e-06	5.5e-07	8.4e-08	3.9e-07	1.2e-06	1.5e-06
Pu-244	4.5e-02	6.7e-03	3.1e-02	1.0e-01	1.3e-01	8.8e-03	1.3e-03	6.1e-03	2.0e-02	2.4e-02
Am-241	9.6e-04	1.4e-04	6.8e-04	2.2e-03	2.7e-03	1.9e-04	2.9e-05	1.4e-04	4.3e-04	5.2e-04
Am-242m	1.5e-03	2.2e-04	1.1e-03	3.3e-03	4.1e-03	2.9e-04	4.5e-05	2.1e-04	6.5e-04	8.0e-04
Am-243	2.0e-02	3.0e-03	1.4e-02	4.4e-02	5.5e-02	3.9e-03	5.9e-04	2.8e-03	8.7e-03	1.1e-02
Cm-242	3.1e-06	4.6e-07	2.2e-06	7.1e-06	8.9e-06	6.2e-07	9.0e-08	4.4e-07	1.4e-06	1.7e-06
Cm-243	1.3e-02	1.9e-03	8.9e-03	2.9e-02	3.6e-02	2.5e-03	3.7e-04	1.8e-03	5.6e-03	7.0e-03
Cm-244	2.8e-06	4.1e-07	1.9e-06	6.2e-06	7.7e-06	5.4e-07	8.1e-08	3.8e-07	1.2e-06	1.5e-06
Cm-245	7.5e-03	1.1e-03	5.2e-03	1.7e-02	2.1e-02	1.5e-03	2.2e-04	1.0e-03	3.3e-03	4.1e-03
Cm-246	2.6e-06	3.8e-07	1.8e-06	5.7e-06	7.2e-06	5.0e-07	7.5e-08	3.5e-07	1.1e-06	1.4e-06
Cm-247	4.1e-02	6.0e-03	2.8e-02	9.2e-02	1.1e-01	8.0e-03	1.2e-03	5.6e-03	1.8e-02	2.2e-02
Cm-248	1.9e-06	2.8e-07	1.3e-06	4.3e-06	5.4e-06	3.8e-07	5.7e-08	2.7e-07	8.5e-07	1.1e-06
Bk-249	9.0e-06	1.0e-06	5.9e-06	2.1e-05	2.8e-05	1.8e-06	2.1e-07	1.2e-06	4.1e-06	5.4e-06
Cf-248	2.5e-06	3.8e-07	1.7e-06	5.6e-06	7.0e-06	5.0e-07	7.5e-08	3.5e-07	1.1e-06	1.4e-06
Cf-249	4.1e-02	6.1e-03	2.8e-02	9.2e-02	1.1e-01	8.0e-03	1.2e-03	5.6e-03	1.8e-02	2.2e-02
Cf-250	2.6e-06	3.9e-07	1.8e-06	5.8e-06	7.1e-06	5.1e-07	7.7e-08	3.6e-07	1.1e-06	1.4e-06
Cf-251	1.2e-02	1.7e-03	8.0e-03	2.6e-02	3.2e-02	2.3e-03	3.5e-04	1.6e-03	5.1e-03	6.3e-03
Cf-252	3.7e-06	5.6e-07	2.6e-06	8.4e-06	1.0e-05	7.4e-07	1.1e-07	5.2e-07	1.7e-06	2.0e-06
Cf-254	5.3e-09	7.6e-10	3.6e-09	1.2e-08	1.5e-08	1.1e-09	1.5e-10	7.2e-10	2.4e-09	3.0e-09
Es-254	1.1e-01	1.6e-02	7.6e-02	2.5e-01	3.1e-01	2.2e-02	3.2e-03	1.5e-02	4.9e-02	6.1e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.62 Normalized effective dose equivalents from all pathways: Leachate-Industrial-dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	3.7e-05	0.0e+00	0.0e+00	0.0e+00	2.2e-06	7.2e-06	0.0e+00	0.0e+00	0.0e+00	4.3e-07
Na-22	6.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	2.5e-13	0.0e+00	0.0e+00	0.0e+00	6.7e-37	4.8e-14	0.0e+00	0.0e+00	0.0e+00	1.3e-37
Cl-36	3.7e-02	0.0e+00	0.0e+00	5.0e-02	1.6e-01	7.2e-03	0.0e+00	0.0e+00	9.7e-03	3.1e-02
K-40	4.6e-01	0.0e+00	0.0e+00	7.1e-01	2.2e+00	9.1e-02	0.0e+00	0.0e+00	1.4e-01	4.4e-01
Ca-41	4.8e-03	0.0e+00	0.0e+00	7.1e-03	2.1e-02	9.5e-04	0.0e+00	0.0e+00	1.4e-03	4.2e-03
Ca-45	2.6e-20	0.0e+00	0.0e+00	3.0e-35	9.1e-35	5.1e-21	0.0e+00	0.0e+00	6.0e-36	1.8e-35
Sc-46	1.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	3.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.8e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	1.6e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	1.2e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	1.2e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	3.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.4e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	6.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	5.6e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	6.4e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	5.0e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	7.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	3.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.4e-29	0.0e+00	0.0e+00	0.0e+00	5.7e-37	4.4e-30	0.0e+00	0.0e+00	0.0e+00	1.1e-37
Sr-89	1.4e-34	0.0e+00	0.0e+00	0.0e+00	2.1e-36	2.6e-35	0.0e+00	0.0e+00	0.0e+00	4.0e-37
Sr-90	1.9e-03	0.0e+00	0.0e+00	0.0e+00	3.9e-08	3.7e-04	0.0e+00	0.0e+00	0.0e+00	8.2e-09
Y-91	4.5e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.5e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	6.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	6.0e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	1.5e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	1.3e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	2.3e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-43	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	3.5e-04	0.0e+00	0.0e+00	0.0e+00	1.5e-04	7.0e-05	0.0e+00	0.0e+00	0.0e+00	3.1e-05
Tc-97	8.0e-04	0.0e+00	0.0e+00	1.3e-03	3.4e-03	1.6e-04	0.0e+00	0.0e+00	2.6e-04	6.8e-04
Tc-97m	1.6e-09	0.0e+00	0.0e+00	5.8e-35	3.5e-34	2.8e-10	0.0e+00	0.0e+00	1.2e-35	6.9e-35
Tc-99	6.8e-03	0.0e+00	0.0e+00	1.1e-02	2.9e-02	1.3e-03	0.0e+00	0.0e+00	2.2e-03	5.8e-03
Ru-103	2.8e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.4e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	2.4e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	3.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.7e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	2.6e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	1.9e-13	0.0e+00	0.0e+00	0.0e+00	1.5e-35	3.4e-14	0.0e+00	0.0e+00	0.0e+00	2.9e-36
Sn-113	8.0e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	6.2e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	3.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	3.7e-10	0.0e+00	0.0e+00	0.0e+00	2.8e-34	7.0e-11	0.0e+00	0.0e+00	0.0e+00	5.5e-35
Te-127m	1.5e-10	0.0e+00	0.0e+00	0.0e+00	4.0e-34	2.8e-11	0.0e+00	0.0e+00	0.0e+00	7.9e-35
I-125	4.8e-14	0.0e+00	0.0e+00	1.2e-33	5.8e-33	8.3e-15	0.0e+00	0.0e+00	2.4e-34	1.2e-33
I-129	8.3e+00	0.0e+00	0.0e+00	7.0e+00	2.8e+01	1.7e+00	0.0e+00	0.0e+00	1.4e+00	5.5e+00
I-131	3.6e-34	0.0e+00	0.0e+00	2.3e-34	1.1e-33	7.3e-35	0.0e+00	0.0e+00	4.6e-35	2.1e-34
Cs-134	7.1e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	2.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	6.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	2.0e-03	0.0e+00	0.0e+00	9.4e-12	1.5e-04	3.8e-04	0.0e+00	0.0e+00	2.0e-12	2.9e-05
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.62 Normalized effective dose equivalents from all pathways: Leachate-industrial-dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	3.0e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	3.5e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.4e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	2.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	7.4e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	8.1e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	1.4e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	1.6e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	6.2e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	3.5e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.8e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	1.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	3.7e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	1.8e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	1.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	1.0e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	2.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	1.4e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	2.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	1.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	1.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	6.2e+00	0.0e+00	0.0e+00	8.7e-01	1.3e+01	1.2e+00	0.0e+00	0.0e+00	1.7e-01	2.5e+00
Pu-236	9.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	1.8e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	2.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	2.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	1.7e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	2.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.4e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	2.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	2.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.3e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	1.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	5.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	3.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	7.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	6.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	1.9e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	3.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.5e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	4.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.7e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.63 Normalized effective dose equivalents from all pathways: Leachate–municipal–dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.4e-05	0.0e+00	0.0e+00	0.0e+00	3.6e-08	2.8e-06	0.0e+00	0.0e+00	0.0e+00	7.3e-09
Na-22	2.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.4e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	8.7e-14	0.0e+00	0.0e+00	0.0e+00	1.5e-37	1.6e-14	0.0e+00	0.0e+00	0.0e+00	2.9e-38
Cl-36	1.6e-02	0.0e+00	0.0e+00	1.6e-02	5.9e-02	3.2e-03	0.0e+00	0.0e+00	3.2e-03	1.2e-02
K-40	2.4e-01	0.0e+00	0.0e+00	2.7e-01	8.5e-01	4.7e-02	0.0e+00	0.0e+00	5.2e-02	1.7e-01
Ca-41	1.9e-03	0.0e+00	0.0e+00	2.5e-03	8.2e-03	3.8e-04	0.0e+00	0.0e+00	4.9e-04	1.6e-03
Ca-45	4.8e-20	0.0e+00	0.0e+00	8.8e-36	2.9e-35	9.7e-21	0.0e+00	0.0e+00	1.7e-36	5.9e-36
Sc-46	3.5e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.0e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	6.9e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	2.9e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.8e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.5e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.8e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	7.9e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	1.0e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	4.8e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	2.7e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.1e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	2.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.5e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	6.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	7.4e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	2.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	1.4e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-43	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	4.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.4e-36	0.0e+00	0.0e+00	0.0e+00	8.9e-38	2.7e-37	0.0e+00	0.0e+00	0.0e+00	1.8e-38
Sr-89	4.0e-38	0.0e+00	0.0e+00	0.0e+00	3.3e-37	7.8e-37	0.0e+00	0.0e+00	0.0e+00	6.6e-38
Sr-90	3.3e-03	0.0e+00	0.0e+00	0.0e+00	5.8e-09	6.6e-04	0.0e+00	0.0e+00	0.0e+00	1.1e-09
Y-91	2.3e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	4.4e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	4.1e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	9.6e-05	0.0e+00	0.0e+00	0.0e+00	3.6e-05	1.9e-05	0.0e+00	0.0e+00	0.0e+00	7.4e-06
Tc-97	3.5e-04	0.0e+00	0.0e+00	5.6e-04	1.5e-03	6.8e-05	0.0e+00	0.0e+00	1.1e-04	3.0e-04
Tc-97m	1.2e-10	0.0e+00	0.0e+00	2.1e-35	1.3e-34	2.5e-11	0.0e+00	0.0e+00	4.3e-36	2.7e-35
Tc-99	3.0e-03	0.0e+00	0.0e+00	4.7e-03	1.3e-02	5.8e-04	0.0e+00	0.0e+00	9.2e-04	2.6e-03
Ru-103	2.0e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	1.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	1.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	7.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	2.5e-14	0.0e+00	0.0e+00	0.0e+00	1.2e-36	4.7e-15	0.0e+00	0.0e+00	0.0e+00	2.2e-37
Sn-113	3.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.0e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.5e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	3.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	4.4e-10	0.0e+00	0.0e+00	0.0e+00	5.5e-35	8.1e-11	0.0e+00	0.0e+00	0.0e+00	1.1e-35
Te-127m	1.9e-10	0.0e+00	0.0e+00	0.0e+00	8.0e-35	3.5e-11	0.0e+00	0.0e+00	0.0e+00	1.6e-35
I-125	2.7e-14	0.0e+00	0.0e+00	3.5e-34	1.7e-33	5.8e-15	0.0e+00	0.0e+00	6.9e-35	3.4e-34
I-129	3.1e+00	0.0e+00	0.0e+00	2.7e+00	1.0e+01	8.1e-01	0.0e+00	0.0e+00	5.3e-01	2.0e+00
I-131	1.4e-34	0.0e+00	0.0e+00	6.4e-35	3.1e-34	2.7e-35	0.0e+00	0.0e+00	1.3e-35	6.1e-35
Cs-134	8.2e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	5.9e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	4.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	1.2e-03	0.0e+00	0.0e+00	9.0e-11	4.4e-05	2.5e-04	0.0e+00	0.0e+00	1.9e-11	9.2e-06
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.63 Normalized effective dose equivalents from all pathways: Leachate-municipal-dust

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	2.4e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	2.8e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.7e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	2.8e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	1.8e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.9e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	2.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.7e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.3e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	5.4e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	5.9e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	2.6e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	1.6e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	2.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	5.9e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	6.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	1.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	1.0e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	7.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	1.0e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	6.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	6.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	2.6e+00	0.0e+00	0.0e+00	1.8e-01	3.8e+00	5.2e-01	0.0e+00	0.0e+00	3.7e-02	7.7e-01
Pu-236	1.3e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	3.9e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.4e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	8.3e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	1.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	1.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	1.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	2.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	2.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	4.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	4.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	1.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	7.0e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	9.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	1.8e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.64 Normalized effective dose equivalents from all pathways: Leachate–industrial–scrap

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.9e-02	0.0e+00	1.4e-05	2.8e-02	7.3e-02	3.8e-03	0.0e+00	2.7e-06	5.4e-03	1.4e-02
C-14	3.2e-02	0.0e+00	0.0e+00	0.0e+00	4.8e-02	6.3e-03	0.0e+00	0.0e+00	0.0e+00	9.5e-03
Na-22	2.0e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	6.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	1.1e-12	0.0e+00	0.0e+00	0.0e+00	7.1e-35	2.0e-13	0.0e+00	0.0e+00	0.0e+00	1.4e-35
Cl-38	3.8e-01	0.0e+00	0.0e+00	5.4e-01	1.6e+00	7.5e-02	0.0e+00	0.0e+00	1.1e-01	3.2e-01
K-40	1.9e+00	0.0e+00	0.0e+00	2.6e+00	7.8e+00	3.7e-01	0.0e+00	0.0e+00	5.2e-01	1.5e+00
Ca-41	2.0e-01	0.0e+00	0.0e+00	3.3e-01	9.0e-01	3.9e-02	0.0e+00	0.0e+00	6.5e-02	1.7e-01
Ca-45	2.5e-19	0.0e+00	0.0e+00	1.5e-33	4.5e-33	5.0e-20	0.0e+00	0.0e+00	3.0e-34	9.0e-34
Sc-46	2.4e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.5e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	2.3e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	8.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	8.2e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	6.7e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	5.5e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	6.4e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	1.5e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.0e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	1.3e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	3.3e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	2.2e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	1.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	9.4e-25	0.0e+00	0.0e+00	0.0e+00	2.0e-35	1.6e-25	0.0e+00	0.0e+00	0.0e+00	4.2e-36
Sr-89	9.5e-29	0.0e+00	0.0e+00	0.0e+00	7.4e-35	1.6e-29	0.0e+00	0.0e+00	0.0e+00	1.5e-35
Sr-90	9.8e-02	0.0e+00	0.0e+00	0.0e+00	2.3e-07	2.0e-02	0.0e+00	0.0e+00	0.0e+00	4.5e-08
Y-91	2.1e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	1.0e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	3.7e-02	0.0e+00	0.0e+00	0.0e+00	4.2e-02	7.3e-03	0.0e+00	0.0e+00	0.0e+00	8.2e-03
Tc-97	1.9e-01	0.0e+00	0.0e+00	3.3e-01	8.1e-01	3.7e-02	0.0e+00	0.0e+00	6.5e-02	1.6e-01
Tc-97m	1.8e-08	0.0e+00	0.0e+00	1.6e-32	9.3e-32	3.6e-09	0.0e+00	0.0e+00	3.3e-33	1.8e-32
Tc-99	1.6e+00	0.0e+00	0.0e+00	2.8e+00	6.9e+00	3.2e-01	0.0e+00	0.0e+00	5.5e-01	1.4e+00
Ru-103	6.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	5.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	2.1e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	1.2e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	5.6e-14	0.0e+00	0.0e+00	0.0e+00	5.5e-35	1.0e-14	0.0e+00	0.0e+00	0.0e+00	1.1e-35
Sn-113	1.1e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	4.8e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	2.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	4.5e-10	0.0e+00	0.0e+00	0.0e+00	9.2e-34	9.1e-11	0.0e+00	0.0e+00	0.0e+00	1.8e-34
Te-127m	2.4e-10	0.0e+00	0.0e+00	0.0e+00	1.3e-33	4.8e-11	0.0e+00	0.0e+00	0.0e+00	2.6e-34
I-125	1.4e-16	0.0e+00	0.0e+00	1.7e-32	8.6e-32	3.2e-17	0.0e+00	0.0e+00	3.2e-33	1.3e-32
I-129	8.3e+01	0.0e+00	0.0e+00	8.8e+01	2.9e+02	1.6e+01	0.0e+00	0.0e+00	1.8e+01	5.8e+01
I-131	4.3e-33	0.0e+00	0.0e+00	3.1e-33	1.2e-32	8.4e-34	0.0e+00	0.0e+00	6.0e-34	2.4e-33
Cs-134	2.0e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	8.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	4.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	8.9e-02	0.0e+00	0.0e+00	3.0e-11	3.3e-03	1.8e-02	0.0e+00	0.0e+00	5.3e-12	6.8e-04
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.64 Normalized effective dose equivalents from all pathways: Leachate-Industrial-scrap

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	2.5e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	5.4e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	4.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	3.6e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	6.0e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.5e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	1.1e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	1.4e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	6.1e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	3.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.8e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	3.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	2.9e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	9.4e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	9.7e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	6.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	1.0e+01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	6.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	6.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	3.2e+02	0.0e+00	0.0e+00	5.1e+01	6.1e+02	6.2e+01	0.0e+00	0.0e+00	1.0e+01	1.2e+02
Pu-236	9.7e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	7.4e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	2.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	2.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.9e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	4.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	2.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	2.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	4.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	2.2e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	9.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	1.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	2.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	2.6e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	6.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	1.0e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	1.4e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.0e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	1.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.65 Normalized effective dose equivalents from all pathways: Leachate-municipal-scrap

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	7.8e-03	0.0e+00	4.0e-06	9.7e-03	2.7e-02	1.5e-03	0.0e+00	7.9e-07	1.9e-03	5.4e-03
C-14	1.3e-02	0.0e+00	0.0e+00	1.2e-04	2.0e-02	2.5e-03	0.0e+00	0.0e+00	2.4e-05	3.8e-03
Na-22	5.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.9e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	2.8e-15	0.0e+00	0.0e+00	0.0e+00	1.0e-35	5.2e-16	0.0e+00	0.0e+00	0.0e+00	2.0e-36
Cl-36	1.5e-01	0.0e+00	0.0e+00	1.6e-01	5.5e-01	3.0e-02	0.0e+00	0.0e+00	3.2e-02	1.1e-01
K-40	7.2e-01	0.0e+00	0.0e+00	8.8e-01	3.0e+00	1.4e-01	0.0e+00	0.0e+00	1.7e-01	5.9e-01
Ca-41	7.9e-02	0.0e+00	0.0e+00	9.9e-02	3.4e-01	1.6e-02	0.0e+00	0.0e+00	2.0e-02	6.7e-02
Ca-45	9.8e-19	0.0e+00	0.0e+00	3.6e-34	1.2e-33	1.7e-19	0.0e+00	0.0e+00	7.2e-35	2.4e-34
Sc-46	6.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.4e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	2.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.0e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	9.8e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	3.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	3.8e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.2e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	6.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	2.8e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.2e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	5.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	9.3e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	1.9e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	1.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	1.3e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	2.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.8e-31	0.0e+00	0.0e+00	0.0e+00	5.1e-38	6.2e-32	0.0e+00	0.0e+00	0.0e+00	9.9e-37
Sr-89	1.3e-34	0.0e+00	0.0e+00	0.0e+00	1.9e-35	2.4e-35	0.0e+00	0.0e+00	0.0e+00	3.6e-36
Sr-90	4.8e-02	0.0e+00	0.0e+00	0.0e+00	3.4e-07	9.1e-03	0.0e+00	0.0e+00	0.0e+00	7.1e-08
Y-91	1.1e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	9.4e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	8.9e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.7e-02	0.0e+00	0.0e+00	0.0e+00	1.4e-02	3.4e-03	0.0e+00	0.0e+00	0.0e+00	2.7e-03
Tc-97	7.5e-02	0.0e+00	0.0e+00	1.2e-01	3.1e-01	1.5e-02	0.0e+00	0.0e+00	2.4e-02	6.3e-02
Tc-97m	2.3e-07	0.0e+00	0.0e+00	5.0e-33	3.5e-32	4.7e-08	0.0e+00	0.0e+00	1.0e-33	7.2e-33
Tc-99	6.4e-01	0.0e+00	0.0e+00	1.0e+00	2.7e+00	1.3e-01	0.0e+00	0.0e+00	2.1e-01	5.3e-01
Ru-103	7.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	1.5e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	4.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	2.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	3.7e-12	0.0e+00	0.0e+00	0.0e+00	2.2e-37	7.0e-13	0.0e+00	0.0e+00	0.0e+00	4.0e-38
Sn-113	9.6e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.2e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	3.1e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.0e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	1.2e-09	0.0e+00	0.0e+00	8.0e-38	2.1e-34	2.8e-10	0.0e+00	0.0e+00	1.1e-38	4.1e-35
Te-127m	8.2e-10	0.0e+00	0.0e+00	8.6e-38	2.9e-34	1.8e-10	0.0e+00	0.0e+00	1.6e-38	5.8e-35
I-125	1.8e-13	0.0e+00	0.0e+00	4.5e-33	1.8e-32	3.4e-14	0.0e+00	0.0e+00	8.8e-34	3.7e-33
I-129	3.5e+01	0.0e+00	0.0e+00	3.0e+01	1.1e+02	7.0e+00	0.0e+00	0.0e+00	5.8e+00	2.2e+01
I-131	2.0e-33	0.0e+00	0.0e+00	8.2e-34	3.3e-33	4.0e-34	0.0e+00	0.0e+00	1.6e-34	6.5e-34
Cs-134	4.1e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	7.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	3.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	5.4e-02	0.0e+00	0.0e+00	2.7e-10	1.7e-03	1.1e-02	0.0e+00	0.0e+00	5.8e-11	3.5e-04
Ce-139	7.0e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	4.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.6e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	2.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.65 Normalized effective dose equivalents from all pathways: Leachate–municipal–scrap

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	4.8e-17	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-17	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	5.1e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	2.2e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.5e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	1.0e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.1e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	3.2e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	9.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	2.1e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.7e-27	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	3.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.1e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	7.1e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	3.7e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.9e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	4.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	2.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	4.1e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	2.6e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	4.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	2.4e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	2.4e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	1.1e+02	0.0e+00	0.0e+00	1.1e+01	1.8e+02	2.3e+01	0.0e+00	0.0e+00	2.2e+00	3.6e+01
Pu-236	1.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	1.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	1.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	1.1e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	1.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	1.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	1.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	3.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	1.4e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	1.3e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	3.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	7.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	6.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	1.9e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	2.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	3.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F1.66 Normalized effective dose equivalents from all pathways: Leachate–steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.6e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.4e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	3.9e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.6e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	1.3e-10	0.0e+00	0.0e+00	1.8e-23	1.1e-22	2.5e-11	0.0e+00	0.0e+00	3.5e-24	2.1e-23
Cl-38	1.7e+00	0.0e+00	0.0e+00	3.2e+00	7.3e+00	3.4e-01	0.0e+00	0.0e+00	6.4e-01	1.5e+00
K-40	2.3e+00	0.0e+00	0.0e+00	4.6e+00	9.6e+00	4.4e-01	0.0e+00	0.0e+00	9.3e-01	1.9e+00
Ca-41	2.1e-01	0.0e+00	0.0e+00	4.3e-01	8.9e-01	4.2e-02	0.0e+00	0.0e+00	8.6e-02	1.8e-01
Ca-45	3.4e-06	0.0e+00	0.0e+00	5.5e-18	1.5e-17	6.7e-07	0.0e+00	0.0e+00	1.1e-18	2.9e-18
Sc-46	3.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.6e-24	0.0e+00	0.0e+00	0.0e+00	2.2e-24	3.2e-25	0.0e+00	0.0e+00	0.0e+00	4.2e-25
Mn-53	2.0e-06	0.0e+00	0.0e+00	0.0e+00	9.2e-07	3.9e-07	0.0e+00	0.0e+00	0.0e+00	1.8e-07
Mn-54	8.9e-10	0.0e+00	0.0e+00	0.0e+00	1.1e-22	2.0e-10	0.0e+00	0.0e+00	0.0e+00	2.0e-23
Fe-55	4.8e-11	0.0e+00	0.0e+00	0.0e+00	7.7e-25	1.0e-11	0.0e+00	0.0e+00	0.0e+00	1.5e-25
Fe-59	2.1e-23	0.0e+00	0.0e+00	0.0e+00	7.7e-24	4.2e-24	0.0e+00	0.0e+00	0.0e+00	1.5e-23
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.8e-11	0.0e+00	0.0e+00	2.1e-19	1.1e-18	9.0e-12	0.0e+00	0.0e+00	4.3e-20	2.1e-19
Sr-89	5.3e-12	0.0e+00	0.0e+00	9.9e-19	5.0e-18	1.3e-12	0.0e+00	0.0e+00	2.0e-19	9.8e-19
Sr-90	5.7e-01	0.0e+00	0.0e+00	8.4e-05	1.5e-01	1.2e-01	0.0e+00	0.0e+00	1.3e-05	2.9e-02
Y-91	9.6e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	2.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	1.5e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	2.7e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.5e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	5.7e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	8.9e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	6.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	3.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.4e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.2e-05	0.0e+00	0.0e+00	2.1e-16	8.4e-16	2.5e-06	0.0e+00	0.0e+00	4.1e-17	1.3e-16
I-129	2.2e+02	0.0e+00	0.0e+00	3.0e+02	7.7e+02	4.4e+01	0.0e+00	0.0e+00	6.0e+01	1.5e+02
I-131	1.8e-16	0.0e+00	0.0e+00	2.5e-16	6.3e-16	3.6e-17	0.0e+00	0.0e+00	4.9e-17	1.3e-16
Cs-134	6.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	9.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	2.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	6.0e-02	0.0e+00	0.0e+00	3.2e-08	3.7e-02	1.2e-02	0.0e+00	0.0e+00	6.4e-09	7.3e-03
Ce-139	7.8e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	2.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	1.4e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	4.5e-28	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.9e-27	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F1.66 Normalized effective dose equivalents from all pathways: Leachate-steel slag

Radionuclide	Mass-based EDE (μSv/y per Bq/g)					Surficial EDE (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.8e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	8.1e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	6.3e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	1.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	6.2e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	1.1e-10	0.0e+00	0.0e+00	0.0e+00	2.2e-22	2.1e-11	0.0e+00	0.0e+00	0.0e+00	4.3e-23
Tm-170	6.1e-10	0.0e+00	0.0e+00	0.0e+00	2.0e-22	1.1e-10	0.0e+00	0.0e+00	0.0e+00	3.9e-23
Tm-171	3.3e-08	0.0e+00	0.0e+00	0.0e+00	2.1e-23	6.2e-09	0.0e+00	0.0e+00	0.0e+00	4.2e-24
Ta-182	1.6e-11	0.0e+00	0.0e+00	0.0e+00	5.0e-23	2.9e-12	0.0e+00	0.0e+00	0.0e+00	9.7e-24
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	6.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	5.7e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	4.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	1.9e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	2.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	1.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	2.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	2.0e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	4.0e-03	0.0e+00	0.0e+00	0.0e+00	1.7e-04	7.9e-04	0.0e+00	0.0e+00	0.0e+00	3.6e-05
U-233	3.4e-03	0.0e+00	0.0e+00	0.0e+00	4.0e-03	6.8e-04	0.0e+00	0.0e+00	0.0e+00	8.0e-04
U-234	2.4e-03	0.0e+00	0.0e+00	0.0e+00	2.7e-03	4.8e-04	0.0e+00	0.0e+00	0.0e+00	5.4e-04
U-235	3.6e-03	0.0e+00	0.0e+00	0.0e+00	4.2e-03	7.2e-04	0.0e+00	0.0e+00	0.0e+00	8.4e-04
U-236	2.2e-03	0.0e+00	0.0e+00	0.0e+00	2.5e-03	4.4e-04	0.0e+00	0.0e+00	0.0e+00	5.0e-04
U-238	2.2e-03	0.0e+00	0.0e+00	0.0e+00	2.5e-03	4.4e-04	0.0e+00	0.0e+00	0.0e+00	5.0e-04
Np-237	1.4e-01	0.0e+00	0.0e+00	1.2e-01	3.5e-01	2.7e-02	0.0e+00	0.0e+00	2.4e-02	6.7e-02
Pu-236	1.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	6.6e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	6.6e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	6.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	1.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	6.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	6.6e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	2.0e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	1.3e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	3.9e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	6.5e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	1.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	7.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	3.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	1.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	1.5e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	3.3e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.4e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	1.8e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.1 Normalized effective doses from all pathways: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	4.1e-05	3.3e-06	2.0e-05	1.1e-04	1.6e-04	8.1e-06	6.6e-07	4.0e-06	2.1e-05	3.1e-05
C-14	1.2e-03	8.0e-05	5.7e-04	3.2e-03	4.6e-03	2.3e-04	1.6e-05	1.1e-04	6.2e-04	9.2e-04
Na-22	4.2e+01	4.2e+00	2.1e+01	1.1e+02	1.6e+02	8.3e+00	8.4e-01	4.2e+00	2.1e+01	3.0e+01
P-32	5.6e-02	5.4e-03	2.8e-02	1.5e-01	2.1e-01	1.1e-02	1.1e-03	5.6e-03	2.9e-02	4.1e-02
S-35	5.5e-04	6.0e-05	2.8e-04	1.4e-03	2.0e-03	1.1e-04	1.2e-05	5.6e-05	2.8e-04	3.9e-04
Cl-36	1.5e-02	1.6e-03	7.8e-03	3.9e-02	5.4e-02	3.0e-03	3.3e-04	1.5e-03	7.7e-03	1.1e-02
K-40	3.4e+00	3.4e-01	1.7e+00	8.6e+00	1.2e+01	6.7e-01	6.7e-02	3.4e-01	1.7e+00	2.4e+00
Ca-41	5.4e-04	3.0e-05	2.5e-04	1.5e-03	2.2e-03	1.1e-04	6.0e-06	5.0e-05	2.9e-04	4.4e-04
Ca-45	2.1e-03	2.0e-04	1.1e-03	5.5e-03	7.7e-03	4.1e-04	4.1e-05	2.1e-04	1.1e-03	1.5e-03
Sc-46	3.7e+01	3.7e+00	1.9e+01	9.5e+01	1.4e+02	7.3e+00	7.3e-01	3.7e+00	1.9e+01	2.7e+01
Cr-51	3.5e-01	3.4e-02	1.8e-01	8.9e-01	1.3e+00	6.9e-02	6.7e-03	3.4e-02	1.8e-01	2.5e-01
Mn-53	6.5e-05	4.8e-06	3.1e-05	1.7e-04	2.5e-04	1.3e-05	9.6e-07	6.2e-06	3.4e-05	5.0e-05
Mn-54	1.6e+01	1.6e+00	8.0e+00	4.0e+01	5.8e+01	3.1e+00	3.1e-01	1.6e+00	8.0e+00	1.1e+01
Fe-55	7.5e-04	6.1e-05	3.7e-04	2.0e-03	2.9e-03	1.5e-04	1.2e-05	7.3e-05	3.9e-04	5.7e-04
Fe-59	2.1e+01	2.1e+00	1.1e+01	5.4e+01	7.7e+01	4.1e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01
Co-56	6.7e+01	6.7e+00	3.4e+01	1.7e+02	2.5e+02	1.3e+01	1.3e+00	6.7e+00	3.5e+01	4.9e+01
Co-57	5.5e-01	5.5e-02	2.8e-01	1.4e+00	2.0e+00	1.1e-01	1.1e-02	5.5e-02	2.8e-01	4.0e-01
Co-58	1.7e+01	1.7e+00	8.5e+00	4.3e+01	6.2e+01	3.3e+00	3.3e-01	1.7e+00	8.6e+00	1.2e+01
Co-60	5.2e+01	5.1e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.7e+01
Ni-59	4.3e-04	4.8e-05	2.2e-04	1.1e-03	1.5e-03	8.5e-05	9.4e-06	4.3e-05	2.2e-04	3.1e-04
Ni-63	3.7e-04	3.2e-05	1.8e-04	9.7e-04	1.4e-03	7.3e-05	6.4e-06	3.6e-05	1.9e-04	2.8e-04
Zn-65	1.1e+01	1.1e+00	5.8e+00	2.9e+01	4.2e+01	2.3e+00	2.3e-01	1.1e+00	5.8e+00	8.3e+00
As-73	3.9e-03	4.1e-04	2.0e-03	1.0e-02	1.4e-02	7.7e-04	8.2e-05	3.9e-04	2.0e-03	2.8e-03
Se-75	3.9e+00	3.9e-01	2.0e+00	1.0e+01	1.4e+01	7.7e-01	7.8e-02	3.9e-01	2.0e+00	2.8e+00
Sr-85	7.6e+00	7.5e-01	3.8e+00	1.9e+01	2.8e+01	1.5e+00	1.5e-01	7.5e-01	3.9e+00	5.5e+00
Sr-89	6.2e-02	6.3e-03	3.2e-02	1.6e-01	2.3e-01	1.2e-02	1.3e-03	6.2e-03	3.2e-02	4.5e-02
Sr-90	2.4e-01	2.6e-02	1.3e-01	6.3e-01	8.8e-01	4.8e-02	5.3e-03	2.5e-02	1.2e-01	1.8e-01
Y-91	1.3e-01	1.3e-02	6.8e-02	3.4e-01	4.9e-01	2.6e-02	2.7e-03	1.3e-02	6.8e-02	9.6e-02
Zr-93	2.8e-03	3.3e-04	1.5e-03	7.5e-03	1.0e-02	5.6e-04	6.5e-05	2.9e-04	1.5e-03	2.0e-03
Zr-95	1.5e+01	1.5e+00	7.5e+00	3.8e+01	5.5e+01	2.9e+00	3.0e-01	1.5e+00	7.5e+00	1.1e+01
Nb-93m	6.2e-04	7.0e-05	3.2e-04	1.6e-03	2.2e-03	1.2e-04	1.4e-05	6.4e-05	3.2e-04	4.5e-04
Nb-94	3.0e+01	3.0e+00	1.5e+01	7.7e+01	1.1e+02	5.9e+00	6.0e-01	3.0e+00	1.5e+01	2.2e+01
Nb-95	1.2e+01	1.2e+00	6.1e+00	3.1e+01	4.4e+01	2.4e+00	2.3e-01	1.2e+00	6.1e+00	8.7e+00
Mo-93	5.2e-03	3.3e-04	2.5e-03	1.4e-02	2.0e-02	1.0e-03	6.6e-05	4.8e-04	2.7e-03	4.1e-03
Tc-97	3.6e-04	3.9e-05	1.8e-04	9.3e-04	1.3e-03	7.1e-05	7.7e-06	3.6e-05	1.8e-04	2.6e-04
Tc-97m	2.7e-03	3.0e-04	1.4e-03	7.1e-03	9.8e-03	5.4e-04	6.0e-05	2.8e-04	1.4e-03	2.0e-03
Tc-99	2.7e-03	2.9e-04	1.4e-03	7.1e-03	1.0e-02	5.4e-04	5.7e-05	2.8e-04	1.4e-03	2.0e-03
Ru-103	7.1e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.0e-01	3.6e+00	5.1e+00
Ru-106	4.1e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01	8.2e-01	8.2e-02	4.1e-01	2.1e+00	3.0e+00
Ag-108m	2.9e+01	2.8e+00	1.5e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Ag-110m	5.2e+01	5.1e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.7e+01
Cd-109	1.3e-02	1.5e-03	6.9e-03	3.5e-02	4.8e-02	2.6e-03	3.0e-04	1.4e-03	6.8e-03	9.5e-03
Sn-113	3.7e+00	3.7e-01	1.9e+00	9.5e+00	1.4e+01	7.4e-01	7.4e-02	3.7e-01	1.9e+00	2.7e+00
Sb-124	3.3e+01	3.3e+00	1.7e+01	8.6e+01	1.2e+02	6.6e+00	6.6e-01	3.3e+00	1.7e+01	2.4e+01
Sb-125	7.0e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.0e-01	3.6e+00	5.1e+00
Te-123m	8.7e-01	8.7e-02	4.4e-01	2.2e+00	3.2e+00	1.7e-01	1.7e-02	8.7e-02	4.5e-01	6.3e-01
Te-127m	8.2e-02	8.4e-03	4.2e-02	2.1e-01	3.0e-01	1.6e-02	1.7e-03	8.3e-03	4.2e-02	5.9e-02
I-125	2.8e-02	1.9e-03	1.3e-02	7.4e-02	1.1e-01	5.5e-03	3.8e-04	2.6e-03	1.5e-02	2.2e-02
I-129	2.0e-01	1.1e-02	9.3e-02	5.5e-01	8.1e-01	4.0e-02	2.1e-03	1.8e-02	1.1e-01	1.6e-01
I-131	2.6e+00	2.2e-01	1.3e+00	6.9e+00	1.0e+01	5.2e-01	4.4e-02	2.5e-01	1.4e+00	2.0e+00
Cs-134	2.9e+01	2.8e+00	1.5e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Cs-135	3.9e-03	2.5e-04	1.9e-03	1.1e-02	1.6e-02	7.8e-04	5.0e-05	3.7e-04	2.1e-03	3.1e-03
Cs-137	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.8e+01	2.0e+00	2.1e-01	1.0e+00	5.2e+00	7.5e+00
Ba-133	4.9e+00	4.8e-01	2.5e+00	1.2e+01	1.8e+01	9.6e-01	9.7e-02	4.9e-01	2.5e+00	3.5e+00
Ce-139	9.2e-01	9.1e-02	4.7e-01	2.4e+00	3.4e+00	1.8e-01	1.8e-02	9.2e-02	4.7e-01	6.7e-01
Ce-141	3.4e-01	3.4e-02	1.7e-01	8.9e-01	1.3e+00	6.8e-02	6.7e-03	3.4e-02	1.8e-01	2.5e-01
Ce-144	9.9e-01	1.0e-01	5.0e-01	2.5e+00	3.7e+00	2.0e-01	2.0e-02	1.0e-01	5.0e-01	7.2e-01
Pm-147	1.7e-03	1.9e-04	8.8e-04	4.4e-03	6.0e-03	3.3e-04	3.9e-05	1.7e-04	8.7e-04	1.2e-03

Table F2.1 Normalized effective doses from all pathways: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.1e-03	1.2e-04	5.6e-04	2.8e-03	3.9e-03	2.1e-04	2.5e-05	1.1e-04	5.6e-04	7.8e-04
Eu-152	2.2e+01	2.2e+00	1.1e+01	5.5e+01	8.0e+01	4.3e+00	4.3e-01	2.2e+00	1.1e+01	1.6e+01
Eu-154	2.1e+01	2.1e+00	1.1e+01	5.5e+01	7.9e+01	4.2e+00	4.3e-01	2.1e+00	1.1e+01	1.5e+01
Eu-155	1.4e-01	1.4e-02	7.0e-02	3.5e-01	5.1e-01	2.7e-02	2.8e-03	1.4e-02	7.0e-02	1.0e-01
Gd-153	1.7e-01	1.7e-02	8.7e-02	4.4e-01	6.3e-01	3.4e-02	3.4e-03	1.7e-02	8.7e-02	1.2e-01
Tb-160	1.9e+01	1.9e+00	9.9e+00	5.0e+01	7.2e+01	3.8e+00	3.8e-01	1.9e+00	1.0e+01	1.4e+01
Tm-170	2.1e-02	2.2e-03	1.1e-02	5.4e-02	7.6e-02	4.1e-03	4.4e-04	2.1e-03	1.1e-02	1.5e-02
Tm-171	9.3e-04	1.1e-04	4.8e-04	2.4e-03	3.3e-03	1.8e-04	2.2e-05	9.5e-05	4.8e-04	6.6e-04
Ta-182	2.3e+01	2.3e+00	1.2e+01	5.9e+01	8.5e+01	4.6e+00	4.6e-01	2.3e+00	1.2e+01	1.7e+01
W-181	3.0e-02	3.0e-03	1.5e-02	7.8e-02	1.1e-01	6.0e-03	6.1e-04	3.0e-03	1.6e-02	2.2e-02
W-185	2.0e-03	2.2e-04	1.0e-03	5.3e-03	7.3e-03	4.0e-04	4.3e-05	2.0e-04	1.0e-03	1.4e-03
Os-185	1.1e+01	1.1e+00	5.6e+00	2.9e+01	3.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.0e+00
Ir-192	1.1e+01	1.1e+00	5.6e+00	2.9e+01	4.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Tl-204	1.2e-02	1.3e-03	6.3e-03	3.1e-02	4.4e-02	2.4e-03	2.6e-04	1.2e-03	6.2e-03	8.8e-03
Pb-210	2.6e+00	2.5e-01	1.3e+00	6.8e+00	9.6e+00	5.1e-01	5.0e-02	2.6e-01	1.3e+00	1.9e+00
Bi-207	2.9e+01	2.8e+00	1.4e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Po-210	1.1e+00	1.2e-01	5.7e-01	2.9e+00	3.9e+00	2.2e-01	2.4e-02	1.1e-01	5.7e-01	7.9e-01
Ra-226	3.5e+01	3.6e+00	1.8e+01	9.0e+01	1.3e+02	6.9e+00	7.1e-01	3.5e+00	1.8e+01	2.5e+01
Ra-228	1.9e+01	1.9e+00	9.5e+00	4.8e+01	6.8e+01	3.7e+00	3.9e-01	1.9e+00	9.4e+00	1.3e+01
Ac-227	2.7e+01	3.2e+00	1.4e+01	7.1e+01	9.5e+01	5.3e+00	6.3e-01	2.8e+00	1.4e+01	1.9e+01
Th-228	3.7e+01	4.1e+00	1.9e+01	9.6e+01	1.3e+02	7.3e+00	8.2e-01	3.7e+00	1.9e+01	2.7e+01
Th-229	3.2e+01	3.8e+00	1.7e+01	8.5e+01	1.1e+02	6.4e+00	7.5e-01	3.3e+00	1.7e+01	2.3e+01
Th-230	1.0e+01	1.2e+00	5.3e+00	2.7e+01	3.6e+01	2.0e+00	2.3e-01	1.0e+00	5.2e+00	7.2e+00
Th-232	1.1e+01	1.2e+00	5.6e+00	2.8e+01	3.8e+01	2.1e+00	2.5e-01	1.1e+00	5.5e+00	7.6e+00
Pa-231	3.3e+01	3.9e+00	1.8e+01	8.8e+01	1.2e+02	6.6e+00	7.8e-01	3.5e+00	1.7e+01	2.4e+01
U-232	9.5e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.8e-01	4.9e+00	6.7e+00
U-233	2.2e+00	2.6e-01	1.2e+00	5.8e+00	7.9e+00	4.4e-01	5.1e-02	2.3e-01	1.1e+00	1.5e+00
U-234	2.2e+00	2.5e-01	1.1e+00	5.7e+00	7.7e+00	4.3e-01	5.0e-02	2.2e-01	1.1e+00	1.5e+00
U-235	3.3e+00	3.9e-01	1.7e+00	8.7e+00	1.2e+01	6.5e-01	7.6e-02	3.4e-01	1.7e+00	2.3e+00
U-236	2.0e+00	2.3e-01	1.1e+00	5.3e+00	7.2e+00	4.0e-01	4.6e-02	2.1e-01	1.0e+00	1.4e+00
U-238	2.4e+00	2.8e-01	1.2e+00	6.3e+00	8.4e+00	4.7e-01	5.6e-02	2.5e-01	1.2e+00	1.7e+00
Np-237	7.9e+00	9.4e-01	4.1e+00	2.1e+01	2.8e+01	1.6e+00	1.8e-01	8.2e-01	4.1e+00	5.5e+00
Pu-236	4.5e+00	5.3e-01	2.4e+00	1.2e+01	1.6e+01	9.0e-01	1.0e-01	4.7e-01	2.3e+00	3.2e+00
Pu-238	1.1e+01	1.3e+00	5.7e+00	2.9e+01	3.9e+01	2.2e+00	2.5e-01	1.1e+00	5.6e+00	7.8e+00
Pu-239	1.2e+01	1.4e+00	6.3e+00	3.1e+01	4.3e+01	2.4e+00	2.7e-01	1.2e+00	6.2e+00	8.5e+00
Pu-240	1.2e+01	1.4e+00	6.3e+00	3.1e+01	4.3e+01	2.4e+00	2.7e-01	1.2e+00	6.2e+00	8.5e+00
Pu-241	2.2e-01	2.5e-02	1.1e-01	5.7e-01	7.7e-01	4.3e-02	5.0e-03	2.2e-02	1.1e-01	1.5e-01
Pu-242	1.1e+01	1.3e+00	5.9e+00	2.9e+01	4.0e+01	2.2e+00	2.6e-01	1.2e+00	5.8e+00	8.0e+00
Pu-244	1.7e+01	2.0e+00	8.9e+00	4.5e+01	6.1e+01	3.4e+00	4.0e-01	1.8e+00	8.8e+00	1.2e+01
Am-241	9.9e+00	1.1e+00	5.2e+00	2.6e+01	3.5e+01	2.0e+00	2.3e-01	1.0e+00	5.1e+00	7.1e+00
Am-242m	1.0e+01	1.2e+00	5.2e+00	2.6e+01	3.5e+01	2.0e+00	2.3e-01	1.0e+00	5.2e+00	7.1e+00
Am-243	1.1e+01	1.3e+00	5.9e+00	3.0e+01	4.0e+01	2.2e+00	2.6e-01	1.2e+00	5.8e+00	8.0e+00
Cm-242	1.1e+00	1.3e-01	6.0e-01	3.0e+00	4.1e+00	2.3e-01	2.6e-02	1.2e-01	5.9e-01	8.2e-01
Cm-243	8.4e+00	9.9e-01	4.4e+00	2.2e+01	3.0e+01	1.7e+00	2.0e-01	8.7e-01	4.3e+00	5.9e+00
Cm-244	6.3e+00	7.3e-01	3.3e+00	1.7e+01	2.3e+01	1.3e+00	1.5e-01	6.5e-01	3.3e+00	4.5e+00
Cm-245	1.1e+01	1.2e+00	5.5e+00	2.8e+01	3.8e+01	2.1e+00	2.5e-01	1.1e+00	5.5e+00	7.5e+00
Cm-246	1.0e+01	1.2e+00	5.3e+00	2.7e+01	3.6e+01	2.0e+00	2.3e-01	1.0e+00	5.2e+00	7.2e+00
Cm-247	1.4e+01	1.7e+00	7.3e+00	3.7e+01	5.0e+01	2.8e+00	3.3e-01	1.4e+00	7.2e+00	9.8e+00
Cm-248	3.6e+01	4.1e+00	1.9e+01	9.3e+01	1.3e+02	7.0e+00	8.2e-01	3.7e+00	1.8e+01	2.5e+01
Bk-249	3.9e-02	4.5e-03	2.0e-02	1.0e-01	1.4e-01	7.7e-03	9.0e-04	4.0e-03	2.0e-02	2.8e-02
Cf-248	2.0e+00	2.3e-01	1.1e+00	5.3e+00	7.2e+00	4.0e-01	4.6e-02	2.1e-01	1.0e+00	1.4e+00
Cf-249	2.2e+01	2.6e+00	1.1e+01	5.7e+01	7.7e+01	4.3e+00	5.1e-01	2.2e+00	1.1e+01	1.5e+01
Cf-250	8.1e+00	9.4e-01	4.2e+00	2.1e+01	2.9e+01	1.6e+00	1.9e-01	8.3e-01	4.2e+00	5.8e+00
Cf-251	1.8e+01	2.1e+00	9.3e+00	4.7e+01	6.4e+01	3.5e+00	4.1e-01	1.8e+00	9.2e+00	1.3e+01
Cf-252	4.5e+00	5.3e-01	2.4e+00	1.2e+01	1.6e+01	9.0e-01	1.0e-01	4.7e-01	2.3e+00	3.2e+00
Cf-254	3.2e+02	3.2e+01	1.6e+02	8.1e+02	1.2e+03	6.2e+01	6.3e+00	3.1e+01	1.6e+02	2.3e+02
Es-254	1.9e+01	2.0e+00	9.9e+00	5.0e+01	7.1e+01	3.8e+00	4.0e-01	1.9e+00	9.8e+00	1.4e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.2 Normalized effective doses from external exposure: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	3.0e-05	3.0e-06	1.5e-05	7.8e-05	1.1e-04	8.0e-06	8.1e-07	3.0e-06	1.5e-05	2.2e-05
Na-22	4.2e+01	4.2e+00	2.1e+01	1.1e+02	1.6e+02	8.3e+00	8.4e-01	4.2e+00	2.1e+01	3.0e+01
P-32	5.3e-02	5.1e-03	2.7e-02	1.4e-01	2.0e-01	1.1e-02	1.0e-03	5.3e-03	2.7e-02	3.9e-02
S-35	2.9e-05	2.9e-06	1.5e-05	7.5e-05	1.1e-04	5.7e-06	5.7e-07	2.9e-06	1.5e-05	2.1e-05
Cl-36	1.2e-02	1.2e-03	6.0e-03	3.0e-02	4.3e-02	2.3e-03	2.3e-04	1.2e-03	6.0e-03	8.5e-03
K-40	3.4e+00	3.3e-01	1.7e+00	8.6e+00	1.2e+01	6.6e-01	6.7e-02	3.4e-01	1.7e+00	2.4e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.0e-04	1.9e-05	9.9e-05	5.0e-04	7.2e-04	3.9e-05	3.9e-06	2.0e-05	9.9e-05	1.4e-04
Sc-46	3.7e+01	3.7e+00	1.9e+01	9.5e+01	1.4e+02	7.3e+00	7.3e-01	3.7e+00	1.9e+01	2.7e+01
Cr-51	3.5e-01	3.4e-02	1.8e-01	8.9e-01	1.3e+00	6.9e-02	6.7e-03	3.4e-02	1.8e-01	2.5e-01
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.6e+01	1.6e+00	8.0e+00	4.0e+01	5.8e+01	3.1e+00	3.1e-01	1.6e+00	8.0e+00	1.1e+01
Fe-55	7.5e-10	7.5e-11	3.8e-10	1.9e-09	2.8e-09	1.5e-10	1.5e-11	7.5e-11	3.8e-10	5.4e-10
Fe-59	2.1e+01	2.1e+00	1.1e+01	5.4e+01	7.7e+01	4.1e+00	4.1e-01	2.1e+00	1.1e+01	1.5e+01
Co-58	6.7e+01	6.7e+00	3.4e+01	1.7e+02	2.5e+02	1.3e+01	1.3e+00	6.7e+00	3.5e+01	4.9e+01
Co-57	5.5e-01	5.4e-02	2.8e-01	1.4e+00	2.0e+00	1.1e-01	1.1e-02	5.5e-02	2.8e-01	4.0e-01
Co-58	1.7e+01	1.7e+00	8.5e+00	4.3e+01	6.2e+01	3.3e+00	3.3e-01	1.7e+00	8.6e+00	1.2e+01
Co-60	5.2e+01	5.1e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.7e+01
Ni-59	2.7e-04	2.7e-05	1.4e-04	7.0e-04	1.0e-03	5.4e-05	5.5e-06	2.7e-05	1.4e-04	2.0e-04
Ni-63	3.0e-07	3.0e-08	1.5e-07	7.6e-07	1.1e-06	5.9e-08	6.0e-09	3.0e-08	1.5e-07	2.2e-07
Zn-65	1.1e+01	1.1e+00	5.8e+00	2.9e+01	4.2e+01	2.3e+00	2.3e-01	1.1e+00	5.8e+00	8.3e+00
As-73	3.3e-03	3.2e-04	1.7e-03	8.4e-03	1.2e-02	6.5e-04	6.5e-05	3.3e-04	1.7e-03	2.4e-03
Se-75	3.9e+00	3.8e-01	2.0e+00	1.0e+01	1.4e+01	7.7e-01	7.8e-02	3.9e-01	2.0e+00	2.8e+00
Sr-85	7.6e+00	7.5e-01	3.8e+00	1.9e+01	2.8e+01	1.5e+00	1.5e-01	7.5e-01	3.9e+00	5.5e+00
Sr-89	5.8e-02	5.7e-03	2.9e-02	1.5e-01	2.1e-01	1.1e-02	1.1e-03	5.8e-03	3.0e-02	4.2e-02
Sr-90	1.9e-01	1.8e-02	9.4e-02	4.7e-01	6.8e-01	3.7e-02	3.7e-03	1.8e-02	9.4e-02	1.3e-01
Y-91	1.3e-01	1.3e-02	6.5e-02	3.3e-01	4.7e-01	2.5e-02	2.5e-03	1.3e-02	6.5e-02	9.3e-02
Zr-93	3.7e-07	3.7e-08	1.9e-07	9.5e-07	1.4e-06	7.4e-08	7.5e-09	3.7e-08	1.9e-07	2.7e-07
Zr-95	1.5e+01	1.5e+00	7.5e+00	3.8e+01	5.5e+01	2.9e+00	3.0e-01	1.5e+00	7.5e+00	1.1e+01
Nb-93m	2.2e-05	2.2e-06	1.1e-05	5.7e-05	8.2e-05	4.4e-06	4.4e-07	2.2e-06	1.1e-05	1.6e-05
Nb-94	3.0e+01	3.0e+00	1.5e+01	7.6e+01	1.1e+02	5.9e+00	6.0e-01	3.0e+00	1.5e+01	2.2e+01
Nb-95	1.2e+01	1.2e+00	6.0e+00	3.1e+01	4.4e+01	2.4e+00	2.3e-01	1.2e+00	6.1e+00	8.7e+00
Mo-93	1.2e-04	1.2e-05	6.1e-05	3.1e-04	4.4e-04	2.4e-05	2.4e-06	1.2e-05	6.1e-05	8.7e-05
Tc-97	1.6e-04	1.6e-05	8.2e-05	4.1e-04	6.0e-04	3.2e-05	3.2e-06	1.6e-05	8.2e-05	1.2e-04
Tc-97m	9.7e-04	9.5e-05	4.9e-04	2.5e-03	3.6e-03	1.9e-04	1.9e-05	9.6e-05	5.0e-04	7.0e-04
Tc-99	4.2e-04	4.1e-05	2.1e-04	1.1e-03	1.5e-03	8.3e-05	8.3e-06	4.2e-05	2.1e-04	3.0e-04
Ru-103	7.1e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.0e-01	3.6e+00	5.1e+00
Ru-106	4.1e+00	4.1e-01	2.1e+00	1.0e+01	1.5e+01	8.1e-01	8.1e-02	4.1e-01	2.1e+00	3.0e+00
Ag-108m	2.9e+01	2.8e+00	1.5e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Ag-110m	5.2e+01	5.1e+00	2.6e+01	1.3e+02	1.9e+02	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.7e+01
Cd-109	8.0e-03	7.9e-04	4.0e-03	2.0e-02	2.9e-02	1.6e-03	1.6e-04	8.0e-04	4.1e-03	5.8e-03
Sn-113	3.7e+00	3.7e-01	1.9e+00	9.5e+00	1.4e+01	7.4e-01	7.4e-02	3.7e-01	1.9e+00	2.7e+00
Sb-124	3.3e+01	3.3e+00	1.7e+01	8.6e+01	1.2e+02	6.6e+00	6.6e-01	3.3e+00	1.7e+01	2.4e+01
Sb-125	7.0e+00	7.0e-01	3.6e+00	1.8e+01	2.6e+01	1.4e+00	1.4e-01	7.0e-01	3.6e+00	5.1e+00
Te-123m	8.7e-01	8.6e-02	4.4e-01	2.2e+00	3.2e+00	1.7e-01	1.7e-02	8.7e-02	4.4e-01	6.3e-01
Te-127m	7.6e-02	7.5e-03	3.9e-02	2.0e-01	2.8e-01	1.5e-02	1.5e-03	7.6e-03	3.9e-02	5.5e-02
I-125	3.6e-03	3.5e-04	1.8e-03	9.2e-03	1.3e-02	7.1e-04	7.0e-05	3.6e-04	1.8e-03	2.6e-03
I-129	3.4e-03	3.3e-04	1.7e-03	8.6e-03	1.2e-02	6.6e-04	6.7e-05	3.4e-04	1.7e-03	2.4e-03
I-131	2.6e+00	2.2e-01	1.3e+00	6.8e+00	9.9e+00	5.2e-01	4.4e-02	2.5e-01	1.4e+00	2.0e+00
Cs-134	2.9e+01	2.8e+00	1.4e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Cs-135	3.2e-04	3.2e-05	1.6e-04	8.2e-04	1.2e-03	6.3e-05	6.4e-06	3.2e-05	1.6e-04	2.3e-04
Cs-137	1.0e+01	1.0e+00	5.2e+00	2.6e+01	3.8e+01	2.0e+00	2.1e-01	1.0e+00	5.2e+00	7.4e+00
Ba-133	4.9e+00	4.8e-01	2.5e+00	1.2e+01	1.8e+01	9.6e-01	9.7e-02	4.9e-01	2.5e+00	3.5e+00
Ce-139	9.2e-01	9.1e-02	4.6e-01	2.4e+00	3.4e+00	1.8e-01	1.8e-02	9.2e-02	4.7e-01	6.7e-01
Ce-141	3.4e-01	3.4e-02	1.7e-01	8.8e-01	1.3e+00	6.8e-02	6.7e-03	3.4e-02	1.8e-01	2.5e-01
Ce-144	9.7e-01	9.6e-02	4.9e-01	2.5e+00	3.6e+00	1.9e-01	1.9e-02	9.7e-02	4.9e-01	7.0e-01
Pm-147	1.2e-04	1.2e-05	6.3e-05	3.2e-04	4.6e-04	2.5e-05	2.5e-06	1.2e-05	6.3e-05	8.9e-05

Table F2.2 Normalized effective doses from external exposure: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.1e-06	1.1e-07	5.7e-07	2.9e-06	4.1e-06	2.2e-07	2.2e-08	1.1e-07	5.7e-07	8.1e-07
Eu-152	2.2e+01	2.2e+00	1.1e+01	5.6e+01	8.0e+01	4.3e+00	4.3e-01	2.2e+00	1.1e+01	1.6e+01
Eu-154	2.1e+01	2.1e+00	1.1e+01	5.5e+01	7.9e+01	4.2e+00	4.3e-01	2.1e+00	1.1e+01	1.5e+01
Eu-155	1.4e-01	1.4e-02	6.9e-02	3.5e-01	5.0e-01	2.7e-02	2.7e-03	1.4e-02	6.9e-02	9.8e-02
Gd-153	1.7e-01	1.7e-02	8.6e-02	4.3e-01	6.3e-01	3.4e-02	3.4e-03	1.7e-02	8.7e-02	1.2e-01
Tb-160	1.9e+01	1.9e+00	9.9e+00	5.0e+01	7.2e+01	3.8e+00	3.8e-01	1.9e+00	1.0e+01	1.4e+01
Tm-170	1.7e-02	1.7e-03	8.7e-03	4.4e-02	6.4e-02	3.4e-03	3.4e-04	1.7e-03	8.8e-03	1.2e-02
Tm-171	4.3e-04	4.2e-05	2.2e-04	1.1e-03	1.6e-03	8.5e-05	8.5e-06	4.3e-05	2.2e-04	3.1e-04
Ta-182	2.3e+01	2.3e+00	1.2e+01	5.9e+01	8.5e+01	4.6e+00	4.6e-01	2.3e+00	1.2e+01	1.7e+01
W-181	3.0e-02	3.0e-03	1.5e-02	7.8e-02	1.1e-01	6.0e-03	6.0e-04	3.0e-03	1.6e-02	2.2e-02
W-185	1.3e-03	1.3e-04	6.6e-04	3.3e-03	4.8e-03	2.6e-04	2.6e-05	1.3e-04	6.6e-04	9.4e-04
Os-185	1.1e+01	1.1e+00	5.6e+00	2.9e+01	4.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.0e+00
Ir-192	1.1e+01	1.1e+00	5.6e+00	2.9e+01	4.1e+01	2.2e+00	2.2e-01	1.1e+00	5.7e+00	8.1e+00
Tl-204	9.8e-03	9.8e-04	5.0e-03	2.5e-02	3.6e-02	1.9e-03	2.0e-04	9.8e-04	5.0e-03	7.1e-03
Pb-210	2.3e-02	2.3e-03	1.2e-02	5.9e-02	8.5e-02	4.6e-03	4.6e-04	2.3e-03	1.2e-02	1.7e-02
Bi-207	2.8e+01	2.8e+00	1.4e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Po-210	1.8e-04	1.8e-05	9.0e-05	4.5e-04	6.6e-04	3.5e-05	3.5e-06	1.8e-05	9.1e-05	1.3e-04
Ra-226	3.4e+01	3.4e+00	1.7e+01	8.7e+01	1.2e+02	6.7e+00	6.6e-01	3.4e+00	1.7e+01	2.4e+01
Ra-228	1.7e+01	1.7e+00	8.4e+00	4.3e+01	6.1e+01	3.3e+00	3.3e-01	1.7e+00	8.5e+00	1.2e+01
Ac-227	5.1e+00	5.1e-01	2.6e+00	1.3e+01	1.9e+01	1.0e+00	1.0e-01	5.1e-01	2.6e+00	3.7e+00
Th-228	2.9e+01	2.8e+00	1.4e+01	7.3e+01	1.1e+02	5.7e+00	5.7e-01	2.9e+00	1.5e+01	2.1e+01
Th-229	3.7e+00	3.7e-01	1.9e+00	9.4e+00	1.4e+01	7.3e-01	7.4e-02	3.7e-01	1.9e+00	2.7e+00
Th-230	1.7e-03	1.7e-04	8.4e-04	4.2e-03	6.0e-03	3.3e-04	3.3e-05	1.6e-04	8.3e-04	1.2e-03
Th-232	5.5e-02	4.2e-03	2.6e-02	1.4e-01	2.1e-01	1.1e-02	8.4e-04	5.2e-03	2.8e-02	4.1e-02
Pa-231	4.1e-01	4.1e-02	2.1e-01	1.1e+00	1.5e+00	8.2e-02	8.2e-03	4.1e-02	2.1e-01	3.0e-01
U-232	2.8e-01	2.2e-02	1.4e-01	7.4e-01	1.1e+00	5.6e-02	4.4e-03	2.7e-02	1.4e-01	2.1e-01
U-233	1.7e-03	1.7e-04	8.5e-04	4.3e-03	6.2e-03	3.3e-04	3.4e-05	1.7e-04	8.6e-04	1.2e-03
U-234	2.9e-04	2.9e-05	1.5e-04	7.5e-04	1.1e-03	5.8e-05	5.9e-06	2.9e-05	1.5e-04	2.1e-04
U-235	1.3e+00	1.3e-01	6.6e-01	3.3e+00	4.8e+00	2.6e-01	2.6e-02	1.3e-01	6.6e-01	9.4e-01
U-236	1.3e-04	1.2e-05	6.3e-05	3.2e-04	4.6e-04	2.5e-05	2.5e-06	1.3e-05	6.4e-05	9.0e-05
U-238	5.1e-01	5.0e-02	2.6e-01	1.3e+00	1.9e+00	1.0e-01	1.0e-02	5.1e-02	2.6e-01	3.6e-01
Np-237	2.6e+00	2.6e-01	1.3e+00	6.6e+00	9.5e+00	5.1e-01	5.1e-02	2.6e-01	1.3e+00	1.9e+00
Pu-236	1.9e-04	1.9e-05	9.5e-05	4.8e-04	6.9e-04	3.7e-05	3.7e-06	1.9e-05	9.6e-05	1.4e-04
Pu-238	6.3e-05	6.3e-06	3.2e-05	1.6e-04	2.3e-04	1.2e-05	1.3e-06	6.3e-06	3.2e-05	4.5e-05
Pu-239	5.1e-04	5.0e-05	2.6e-04	1.3e-03	1.9e-03	1.0e-04	1.0e-05	5.1e-05	2.6e-04	3.6e-04
Pu-240	5.8e-05	5.8e-06	3.0e-05	1.5e-04	2.1e-04	1.2e-05	1.2e-06	5.8e-06	3.0e-05	4.2e-05
Pu-241	6.3e-06	6.3e-07	3.2e-06	1.6e-05	2.3e-05	1.2e-06	1.3e-07	6.3e-07	3.2e-06	4.5e-06
Pu-242	5.3e-05	5.3e-06	2.7e-05	1.4e-04	1.9e-04	1.0e-05	1.1e-06	5.3e-06	2.7e-05	3.8e-05
Pu-244	6.0e+00	5.9e-01	3.0e+00	1.5e+01	2.2e+01	1.2e+00	1.2e-01	5.9e-01	3.0e+00	4.3e+00
Am-241	1.9e-02	1.9e-03	9.5e-03	4.8e-02	6.9e-02	3.7e-03	3.7e-04	1.9e-03	9.5e-03	1.3e-02
Am-242m	1.1e-01	1.1e-02	5.4e-02	2.7e-01	3.9e-01	2.1e-02	2.1e-03	1.1e-02	5.4e-02	7.6e-02
Am-243	1.4e+00	1.4e-01	7.2e-01	3.7e+00	5.3e+00	2.8e-01	2.9e-02	1.4e-01	7.3e-01	1.0e+00
Cm-242	8.0e-05	7.9e-06	4.0e-05	2.0e-04	3.0e-04	1.6e-05	1.6e-06	8.0e-06	4.1e-05	5.8e-05
Cm-243	1.0e+00	1.0e-01	5.2e-01	2.6e+00	3.8e+00	2.0e-01	2.1e-02	1.0e-01	5.2e-01	7.4e-01
Cm-244	7.1e-05	7.0e-06	3.6e-05	1.8e-04	2.6e-04	1.4e-05	1.4e-06	7.0e-06	3.6e-05	5.1e-05
Cm-245	4.1e-01	4.1e-02	2.1e-01	1.0e+00	1.5e+00	8.1e-02	8.2e-03	4.1e-02	2.1e-01	3.0e-01
Cm-246	2.1e-05	2.1e-06	1.1e-05	5.4e-05	7.8e-05	4.2e-06	4.2e-07	2.1e-06	1.1e-05	1.5e-05
Cm-247	4.9e+00	4.9e-01	2.5e+00	1.3e+01	1.8e+01	9.7e-01	9.8e-02	4.9e-01	2.5e+00	3.5e+00
Cm-248	1.9e-05	1.9e-06	9.8e-06	4.9e-05	7.1e-05	3.8e-06	3.9e-07	1.9e-06	9.8e-06	1.4e-05
Bk-249	2.7e-04	2.1e-05	1.3e-04	6.9e-04	1.0e-03	5.4e-05	4.3e-06	2.6e-05	1.4e-04	2.0e-04
Cf-248	8.4e-05	8.4e-06	4.3e-05	2.2e-04	3.1e-04	1.7e-05	1.7e-06	8.4e-06	4.3e-05	6.1e-05
Cf-249	4.8e+00	4.8e-01	2.4e+00	1.2e+01	1.8e+01	9.5e-01	9.5e-02	4.8e-01	2.4e+00	3.5e+00
Cf-250	2.4e-05	2.3e-06	1.2e-05	6.0e-05	8.7e-05	4.7e-06	4.7e-07	2.4e-06	1.2e-05	1.7e-05
Cf-251	7.3e-01	7.3e-02	3.7e-01	1.9e+00	2.7e+00	1.5e-01	1.5e-02	7.3e-02	3.7e-01	5.3e-01
Cf-252	6.5e-05	8.4e-06	4.3e-05	2.2e-04	3.1e-04	1.7e-05	1.7e-06	8.5e-06	4.3e-05	6.1e-05
Cf-254	3.1e+02	3.0e+01	1.6e+02	7.9e+02	1.1e+03	6.1e+01	6.0e+00	3.1e+01	1.6e+02	2.2e+02
Es-254	1.7e+01	1.7e+00	8.8e+00	4.4e+01	6.4e+01	3.4e+00	3.5e-01	1.7e+00	8.8e+00	1.3e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.3 Normalized effective doses from inhalation: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.0e-05	1.2e-06	5.3e-06	2.6e-05	3.6e-05	2.0e-06	2.3e-07	1.0e-06	5.2e-06	7.2e-06
C-14	1.4e-04	1.6e-05	7.4e-05	3.7e-04	5.1e-04	2.8e-05	3.3e-06	1.5e-05	7.3e-05	1.0e-04
Na-22	3.2e-04	3.6e-05	1.7e-04	8.3e-04	1.1e-03	6.2e-05	7.3e-06	3.2e-05	1.6e-04	2.3e-04
P-32	4.9e-04	5.3e-05	2.5e-04	1.3e-03	1.8e-03	9.8e-05	1.1e-05	5.0e-05	2.6e-04	3.5e-04
S-35	2.9e-04	3.4e-05	1.5e-04	7.7e-04	1.1e-03	5.8e-05	6.7e-06	3.0e-05	1.5e-04	2.1e-04
Cl-36	1.7e-03	1.9e-04	8.8e-04	4.4e-03	6.1e-03	3.3e-04	3.9e-05	1.7e-04	8.7e-04	1.2e-03
K-40	5.1e-04	5.9e-05	2.7e-04	1.4e-03	1.8e-03	1.0e-04	1.2e-05	5.3e-05	2.7e-04	3.7e-04
Ca-41	4.2e-05	4.8e-06	2.2e-05	1.1e-04	1.5e-04	8.2e-06	9.6e-07	4.3e-06	2.2e-05	3.0e-05
Ca-45	6.3e-04	7.3e-05	3.3e-04	1.7e-03	2.3e-03	1.3e-04	1.5e-05	6.5e-05	3.3e-04	4.5e-04
Sc-46	1.4e-03	1.7e-04	7.6e-04	3.8e-03	5.2e-03	2.9e-04	3.3e-05	1.5e-04	7.4e-04	1.0e-03
Cr-51	6.9e-06	7.8e-07	3.6e-06	1.8e-05	2.5e-05	1.4e-06	1.6e-07	7.1e-07	3.6e-06	4.9e-06
Mn-53	1.3e-05	1.5e-06	6.7e-06	3.4e-05	4.6e-05	2.5e-06	2.9e-07	1.3e-06	6.6e-06	9.1e-06
Mn-54	3.6e-04	4.1e-05	1.9e-04	9.5e-04	1.3e-03	7.1e-05	8.2e-06	3.7e-05	1.8e-04	2.6e-04
Fe-55	1.9e-04	2.1e-05	9.8e-05	4.9e-04	6.7e-04	3.7e-05	4.3e-06	1.9e-05	9.7e-05	1.3e-04
Fe-59	4.6e-04	5.3e-05	2.4e-04	1.2e-03	1.7e-03	9.1e-05	1.1e-05	4.8e-05	2.4e-04	3.3e-04
Co-56	1.4e-03	1.6e-04	7.4e-04	3.7e-03	5.1e-03	2.8e-04	3.2e-05	1.5e-04	7.3e-04	1.0e-03
Co-57	2.2e-04	2.6e-05	1.2e-04	5.9e-04	8.1e-04	4.4e-05	5.1e-06	2.3e-05	1.2e-04	1.6e-04
Co-58	4.4e-04	5.1e-05	2.3e-04	1.2e-03	1.6e-03	8.8e-05	1.0e-05	4.6e-05	2.3e-04	3.2e-04
Co-60	7.1e-03	8.1e-04	3.7e-03	1.9e-02	2.5e-02	1.4e-03	1.6e-04	7.3e-04	3.7e-03	5.1e-03
Ni-59	4.4e-05	5.1e-06	2.3e-05	1.2e-04	1.6e-04	8.7e-06	1.0e-06	4.5e-06	2.3e-05	3.2e-05
Ni-63	1.1e-04	1.2e-05	5.6e-05	2.8e-04	3.9e-04	2.1e-05	2.5e-06	1.1e-05	5.6e-05	7.7e-05
Zn-65	8.9e-04	7.9e-05	3.6e-04	1.8e-03	2.5e-03	1.4e-04	1.6e-05	7.1e-05	3.6e-04	4.9e-04
As-73	2.1e-04	2.4e-05	1.1e-04	5.5e-04	7.6e-04	4.1e-05	4.8e-06	2.2e-05	1.1e-04	1.5e-04
Se-75	3.2e-04	3.7e-05	1.7e-04	8.5e-04	1.2e-03	6.4e-05	7.4e-06	3.3e-05	1.7e-04	2.3e-04
Sr-85	8.6e-05	9.8e-06	4.5e-05	2.3e-04	3.1e-04	1.7e-05	2.0e-06	8.8e-06	4.4e-05	6.1e-05
Sr-89	2.1e-04	2.4e-05	1.1e-04	5.6e-04	7.7e-04	4.2e-05	4.9e-06	2.2e-05	1.1e-04	1.5e-04
Sr-90	8.2e-03	7.2e-04	3.3e-03	1.6e-02	2.2e-02	1.2e-03	1.4e-04	6.4e-04	3.2e-03	4.5e-03
Y-91	1.8e-03	2.1e-04	9.6e-04	4.8e-03	6.6e-03	3.6e-04	4.2e-05	1.9e-04	9.5e-04	1.3e-03
Zr-93	2.3e-03	2.7e-04	1.2e-03	6.2e-03	8.5e-03	4.6e-04	5.4e-05	2.4e-04	1.2e-03	1.7e-03
Zr-95	1.1e-03	1.2e-04	5.5e-04	2.8e-03	3.8e-03	2.1e-04	2.4e-05	1.1e-04	5.4e-04	7.6e-04
Nb-93m	3.9e-04	4.5e-05	2.0e-04	1.0e-03	1.4e-03	7.7e-05	9.0e-06	4.0e-05	2.0e-04	2.8e-04
Nb-94	1.1e-02	1.3e-03	5.8e-03	2.9e-02	4.0e-02	2.2e-03	2.5e-04	1.1e-03	5.7e-03	7.9e-03
Nb-95	3.2e-04	3.7e-05	1.7e-04	8.5e-04	1.2e-03	6.4e-05	7.3e-06	3.3e-05	1.7e-04	2.3e-04
Mo-93	5.4e-04	6.2e-05	2.8e-04	1.4e-03	1.9e-03	1.1e-04	1.2e-05	5.5e-05	2.8e-04	3.9e-04
Tc-97	5.1e-05	5.9e-06	2.7e-05	1.4e-04	1.8e-04	1.0e-05	1.2e-06	5.3e-06	2.7e-05	3.7e-05
Tc-97m	7.0e-04	8.0e-05	3.7e-04	1.8e-03	2.5e-03	1.4e-04	1.6e-05	7.2e-05	3.6e-04	5.0e-04
Tc-99	9.5e-04	1.1e-04	5.0e-04	2.5e-03	3.4e-03	1.9e-04	2.2e-05	9.8e-05	4.9e-04	6.8e-04
Ru-103	5.8e-04	6.5e-05	3.0e-04	1.5e-03	2.1e-03	1.1e-04	1.3e-05	5.9e-05	3.0e-04	4.1e-04
Ru-106	1.5e-02	1.7e-03	7.8e-03	3.9e-02	5.4e-02	2.9e-03	3.4e-04	1.5e-03	7.7e-03	1.1e-02
Ag-108m	8.6e-03	9.8e-04	4.5e-03	2.3e-02	3.1e-02	1.7e-03	2.0e-04	8.8e-04	4.4e-03	6.1e-03
Ag-110m	2.9e-03	3.3e-04	1.5e-03	7.5e-03	1.0e-02	5.7e-04	6.6e-05	2.9e-04	1.5e-03	2.0e-03
Cd-109	2.0e-03	2.2e-04	1.0e-03	5.2e-03	7.0e-03	3.9e-04	4.5e-05	2.0e-04	1.0e-03	1.4e-03
Sn-113	5.8e-04	6.7e-05	3.0e-04	1.5e-03	2.1e-03	1.1e-04	1.3e-05	6.0e-05	3.0e-04	4.1e-04
Sb-124	1.3e-03	1.5e-04	7.0e-04	3.5e-03	4.8e-03	2.6e-04	3.1e-05	1.4e-04	6.9e-04	9.5e-04
Sb-125	1.3e-03	1.5e-04	6.7e-04	3.4e-03	4.6e-03	2.5e-04	2.9e-05	1.3e-04	6.6e-04	9.2e-04
Te-123m	9.0e-04	1.0e-04	4.7e-04	2.4e-03	3.2e-03	1.8e-04	2.1e-05	9.3e-05	4.6e-04	6.4e-04
Te-127m	1.7e-03	1.9e-04	8.8e-04	4.4e-03	6.1e-03	3.3e-04	3.9e-05	1.7e-04	8.7e-04	1.2e-03
I-125	1.2e-03	1.3e-04	6.1e-04	3.1e-03	4.2e-03	2.3e-04	2.7e-05	1.2e-04	6.0e-04	8.3e-04
I-129	9.0e-03	1.0e-03	4.7e-03	2.4e-02	3.3e-02	1.8e-03	2.1e-04	9.3e-04	4.7e-03	6.5e-03
I-131	8.4e-04	7.9e-05	4.2e-04	2.2e-03	3.1e-03	1.7e-04	1.6e-05	8.3e-05	4.4e-04	6.2e-04
Cs-134	1.6e-03	1.9e-04	8.6e-04	4.3e-03	5.9e-03	3.3e-04	3.8e-05	1.7e-04	8.5e-04	1.2e-03
Cs-135	1.7e-04	2.0e-05	9.1e-05	4.6e-04	6.2e-04	3.4e-05	4.0e-06	1.8e-05	9.0e-05	1.2e-04
Cs-137	1.2e-03	1.3e-04	6.2e-04	3.1e-03	4.2e-03	2.3e-04	2.7e-05	1.2e-04	6.1e-04	8.4e-04
Ba-133	3.7e-04	4.2e-05	1.9e-04	9.7e-04	1.3e-03	7.2e-05	8.4e-06	3.8e-05	1.9e-04	2.6e-04
Ce-139	4.2e-04	4.8e-05	2.2e-04	1.1e-03	1.5e-03	8.3e-05	9.6e-06	4.3e-05	2.2e-04	3.0e-04
Ce-141	7.1e-04	8.1e-05	3.7e-04	1.9e-03	2.6e-03	1.4e-04	1.6e-05	7.4e-05	3.7e-04	5.1e-04
Ce-144	1.2e-02	1.3e-03	6.1e-03	3.1e-02	4.2e-02	2.3e-03	2.7e-04	1.2e-03	6.0e-03	8.4e-03
Pm-147	1.1e-03	1.3e-04	5.9e-04	2.9e-03	4.0e-03	2.2e-04	2.6e-05	1.1e-04	5.8e-04	8.0e-04

Table F2.3 Normalized effective doses from inhalation: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	9.0e-04	1.0e-04	4.7e-04	2.4e-03	3.3e-03	1.8e-04	2.1e-05	9.3e-05	4.7e-04	6.5e-04
Eu-152	9.5e-03	1.1e-03	5.0e-03	2.5e-02	3.4e-02	1.9e-03	2.2e-04	9.8e-04	4.9e-03	6.8e-03
Eu-154	1.2e-02	1.4e-03	6.4e-03	3.2e-02	4.4e-02	2.4e-03	2.8e-04	1.3e-03	6.3e-03	8.8e-03
Eu-155	1.6e-03	1.8e-04	8.3e-04	4.2e-03	5.7e-03	3.1e-04	3.6e-05	1.6e-04	8.2e-04	1.1e-03
Gd-153	4.5e-04	5.2e-05	2.4e-04	1.2e-03	1.6e-03	8.9e-05	1.0e-05	4.7e-05	2.3e-04	3.2e-04
Tb-160	1.5e-03	1.7e-04	7.7e-04	3.9e-03	5.3e-03	2.9e-04	3.4e-05	1.5e-04	7.6e-04	1.0e-03
Tm-170	1.5e-03	1.8e-04	8.0e-04	4.0e-03	5.5e-03	3.0e-04	3.5e-05	1.6e-04	7.9e-04	1.1e-03
Tm-171	3.1e-04	3.6e-05	1.6e-04	8.3e-04	1.1e-03	6.2e-05	7.2e-06	3.2e-05	1.6e-04	2.3e-04
Ta-182	2.2e-03	2.6e-04	1.2e-03	5.9e-03	8.1e-03	4.4e-04	5.1e-05	2.3e-04	1.2e-03	1.6e-03
W-181	6.5e-06	7.4e-07	3.4e-06	1.7e-05	2.3e-05	1.3e-06	1.5e-07	6.7e-07	3.3e-06	4.6e-06
W-185	3.1e-05	3.6e-06	1.6e-05	8.2e-05	1.1e-04	6.2e-06	7.2e-07	3.2e-06	1.6e-05	2.2e-05
Os-185	3.4e-04	3.9e-05	1.8e-04	9.0e-04	1.2e-03	6.8e-05	7.8e-06	3.5e-05	1.8e-04	2.4e-04
Ir-192	1.4e-03	1.6e-04	7.2e-04	3.6e-03	5.0e-03	2.7e-04	3.2e-05	1.4e-04	7.1e-04	9.8e-04
Tl-204	1.1e-04	1.2e-05	5.6e-05	2.8e-04	3.9e-04	2.1e-05	2.5e-06	1.1e-05	5.5e-05	7.7e-05
Pb-210	9.7e-01	1.1e-01	5.1e-01	2.6e+00	3.5e+00	1.9e-01	2.2e-02	1.0e-01	5.0e-01	7.0e-01
Bi-207	1.3e-03	1.5e-04	6.7e-04	3.3e-03	4.6e-03	2.5e-04	2.9e-05	1.3e-04	6.6e-04	9.1e-04
Po-210	7.0e-01	8.0e-02	3.7e-01	1.8e+00	2.5e+00	1.4e-01	1.6e-02	7.2e-02	3.6e-01	5.0e-01
Ra-226	7.9e-01	9.1e-02	4.1e-01	2.1e+00	2.8e+00	1.6e-01	1.8e-02	8.1e-02	4.1e-01	5.6e-01
Ra-228	7.2e-01	8.2e-02	3.7e-01	1.9e+00	2.6e+00	1.4e-01	1.7e-02	7.4e-02	3.7e-01	5.2e-01
Ac-227	2.0e+01	2.3e+00	1.0e+01	5.2e+01	7.1e+01	3.9e+00	4.5e-01	2.0e+00	1.0e+01	1.4e+01
Th-228	8.2e+00	9.5e-01	4.3e+00	2.2e+01	3.0e+01	1.6e+00	1.9e-01	8.5e-01	4.2e+00	5.9e+00
Th-229	2.8e+01	3.2e+00	1.4e+01	7.3e+01	9.9e+01	5.5e+00	6.3e-01	2.8e+00	1.4e+01	2.0e+01
Th-230	9.8e+00	1.1e+00	5.1e+00	2.6e+01	3.5e+01	1.9e+00	2.3e-01	1.0e+00	5.1e+00	7.0e+00
Th-232	1.0e+01	1.2e+00	5.4e+00	2.7e+01	3.7e+01	2.0e+00	2.4e-01	1.1e+00	5.3e+00	7.4e+00
Pa-231	3.2e+01	3.7e+00	1.7e+01	8.4e+01	1.1e+02	6.3e+00	7.3e-01	3.3e+00	1.6e+01	2.3e+01
U-232	8.6e+00	9.9e-01	4.5e+00	2.3e+01	3.1e+01	1.7e+00	2.0e-01	8.9e-01	4.5e+00	6.2e+00
U-233	2.1e+00	2.4e-01	1.1e+00	5.6e+00	7.7e+00	4.2e-01	4.9e-02	2.2e-01	1.1e+00	1.5e+00
U-234	2.1e+00	2.4e-01	1.1e+00	5.5e+00	7.5e+00	4.1e-01	4.8e-02	2.1e-01	1.1e+00	1.5e+00
U-235	1.9e+00	2.2e-01	9.9e-01	5.0e+00	6.8e+00	3.7e-01	4.3e-02	1.9e-01	9.7e-01	1.4e+00
U-236	1.9e+00	2.2e-01	1.0e+00	5.1e+00	7.0e+00	3.8e-01	4.4e-02	2.0e-01	1.0e+00	1.4e+00
U-238	1.8e+00	2.1e-01	9.4e-01	4.7e+00	6.4e+00	3.5e-01	4.1e-02	1.8e-01	9.3e-01	1.3e+00
Np-237	5.1e+00	5.9e-01	2.7e+00	1.4e+01	1.8e+01	1.0e+00	1.2e-01	5.5e-01	2.7e+00	3.7e+00
Pu-236	4.4e+00	5.0e-01	2.3e+00	1.2e+01	1.6e+01	8.7e-01	1.0e-01	4.5e-01	2.3e+00	3.1e+00
Pu-238	1.1e+01	1.2e+00	5.5e+00	2.8e+01	3.8e+01	2.1e+00	2.4e-01	1.1e+00	5.4e+00	7.5e+00
Pu-239	1.1e+01	1.3e+00	6.0e+00	3.0e+01	4.1e+01	2.3e+00	2.6e-01	1.2e+00	6.0e+00	8.2e+00
Pu-240	1.1e+01	1.3e+00	6.0e+00	3.0e+01	4.1e+01	2.3e+00	2.6e-01	1.2e+00	6.0e+00	8.2e+00
Pu-241	2.1e-01	2.4e-02	1.1e-01	5.5e-01	7.5e-01	4.1e-02	4.8e-03	2.1e-02	1.1e-01	1.5e-01
Pu-242	1.1e+01	1.2e+00	5.6e+00	2.8e+01	3.9e+01	2.1e+00	2.5e-01	1.1e+00	5.6e+00	7.7e+00
Pu-244	1.1e+01	1.2e+00	5.6e+00	2.8e+01	3.9e+01	2.1e+00	2.5e-01	1.1e+00	5.6e+00	7.7e+00
Am-241	9.5e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.8e-01	4.9e+00	6.8e+00
Am-242m	9.5e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.8e-01	4.9e+00	6.8e+00
Am-243	9.5e+00	1.1e+00	5.0e+00	2.5e+01	3.4e+01	1.9e+00	2.2e-01	9.8e-01	4.9e+00	6.8e+00
Cm-242	1.1e+00	1.3e-01	5.9e-01	3.0e+00	4.1e+00	2.2e-01	2.6e-02	1.2e-01	5.8e-01	8.1e-01
Cm-243	7.1e+00	8.2e-01	3.7e+00	1.9e+01	2.6e+01	1.4e+00	1.6e-01	7.3e-01	3.7e+00	5.1e+00
Cm-244	8.1e+00	7.0e-01	3.2e+00	1.6e+01	2.2e+01	1.2e+00	1.4e-01	6.3e-01	3.2e+00	4.4e+00
Cm-245	9.8e+00	1.1e+00	5.1e+00	2.6e+01	3.5e+01	1.9e+00	2.3e-01	1.0e+00	5.1e+00	7.0e+00
Cm-246	9.8e+00	1.1e+00	5.1e+00	2.6e+01	3.5e+01	1.9e+00	2.3e-01	1.0e+00	5.1e+00	7.0e+00
Cm-247	8.8e+00	1.0e+00	4.6e+00	2.3e+01	3.2e+01	1.7e+00	2.0e-01	9.1e-01	4.6e+00	6.3e+00
Cm-248	3.4e+01	3.9e+00	1.8e+01	9.0e+01	1.2e+02	6.8e+00	7.9e-01	3.5e+00	1.8e+01	2.5e+01
Bk-249	3.7e-02	4.2e-03	1.9e-02	9.7e-02	1.3e-01	7.3e-03	8.5e-04	3.8e-03	1.9e-02	2.6e-02
Cf-248	2.0e+00	2.3e-01	1.0e+00	5.2e+00	7.1e+00	3.9e-01	4.5e-02	2.0e-01	1.0e+00	1.4e+00
Cf-249	1.6e+01	1.9e+00	8.5e+00	4.3e+01	5.8e+01	3.2e+00	3.7e-01	1.7e+00	8.4e+00	1.2e+01
Cf-250	7.8e+00	9.0e-01	4.1e+00	2.1e+01	2.8e+01	1.5e+00	1.8e-01	8.0e-01	4.0e+00	5.6e+00
Cf-251	1.6e+01	1.9e+00	8.6e+00	4.3e+01	5.9e+01	3.2e+00	3.8e-01	1.7e+00	8.5e+00	1.2e+01
Cf-252	4.4e+00	5.0e-01	2.3e+00	1.2e+01	1.6e+01	8.7e-01	1.0e-01	4.5e-01	2.3e+00	3.1e+00
Cf-254	8.1e+00	9.3e-01	4.2e+00	2.1e+01	2.9e+01	1.6e+00	1.9e-01	8.3e-01	4.2e+00	5.8e+00
Es-254	1.9e+00	2.2e-01	1.0e+00	5.1e+00	6.9e+00	3.8e-01	4.4e-02	2.0e-01	9.9e-01	1.4e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.4 Normalized effective doses from ingestion: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	3.1e-05	1.1e-06	1.4e-05	8.5e-05	1.3e-04	6.1e-06	2.2e-07	2.7e-06	1.7e-05	2.5e-05
C-14	1.0e-03	3.5e-05	4.5e-04	2.8e-03	4.1e-03	2.0e-04	7.0e-06	8.9e-05	5.4e-04	8.2e-04
Na-22	5.5e-03	1.9e-04	2.5e-03	1.5e-02	2.2e-02	1.1e-03	3.9e-05	4.9e-04	3.0e-03	4.5e-03
P-32	2.6e-03	8.8e-05	1.1e-03	7.1e-03	1.1e-02	5.2e-04	1.8e-05	2.3e-04	1.4e-03	2.1e-03
S-35	2.2e-04	7.9e-06	1.0e-04	6.2e-04	9.1e-04	4.4e-05	1.6e-06	2.0e-05	1.2e-04	1.8e-04
Cl-36	1.6e-03	5.7e-05	7.2e-04	4.4e-03	6.6e-03	3.2e-04	1.1e-05	1.4e-04	8.7e-04	1.3e-03
K-40	1.1e-02	3.8e-04	4.8e-03	3.0e-02	4.4e-02	2.1e-03	7.5e-05	9.5e-04	5.8e-03	8.7e-03
Ca-41	5.0e-04	1.8e-05	2.2e-04	1.4e-03	2.0e-03	9.9e-05	3.5e-06	4.4e-05	2.7e-04	4.1e-04
Ca-45	1.3e-03	4.4e-05	5.7e-04	3.5e-03	5.1e-03	2.5e-04	8.8e-06	1.1e-04	6.8e-04	1.0e-03
Sc-46	2.4e-03	8.4e-05	1.1e-03	6.6e-03	9.7e-03	4.7e-04	1.7e-05	2.1e-04	1.3e-03	1.9e-03
Cr-51	5.0e-05	1.8e-06	2.2e-05	1.4e-04	2.0e-04	9.9e-06	3.5e-07	4.4e-06	2.7e-05	4.0e-05
Mn-53	5.2e-05	1.8e-06	2.3e-05	1.4e-04	2.1e-04	1.0e-05	3.6e-07	4.6e-06	2.8e-05	4.2e-05
Mn-54	1.2e-03	4.2e-05	5.4e-04	3.3e-03	4.9e-03	2.4e-04	8.4e-06	1.1e-04	6.5e-04	9.8e-04
Fe-55	5.7e-04	2.0e-05	2.5e-04	1.6e-03	2.3e-03	1.1e-04	4.0e-06	5.0e-05	3.1e-04	4.6e-04
Fe-59	2.7e-03	9.3e-05	1.2e-03	7.4e-03	1.1e-02	5.3e-04	1.9e-05	2.4e-04	1.5e-03	2.1e-03
Co-56	3.6e-03	1.3e-04	1.6e-03	1.0e-02	1.5e-02	7.2e-04	2.5e-05	3.2e-04	2.0e-03	3.0e-03
Co-57	3.2e-04	1.1e-05	1.4e-04	8.8e-04	1.3e-03	6.3e-05	2.2e-06	2.8e-05	1.7e-04	2.6e-04
Co-58	1.1e-03	3.9e-05	5.0e-04	3.0e-03	4.5e-03	2.2e-04	7.7e-06	9.7e-05	6.0e-04	8.9e-04
Co-60	4.3e-03	1.5e-04	1.9e-03	1.2e-02	1.8e-02	8.5e-04	3.0e-05	3.8e-04	2.3e-03	3.5e-03
Ni-59	1.1e-04	3.8e-06	4.9e-05	3.0e-04	4.4e-04	2.2e-05	7.6e-07	9.6e-06	5.9e-05	8.9e-05
Ni-63	2.6e-04	9.1e-06	1.2e-04	7.1e-04	1.1e-03	5.1e-05	1.8e-06	2.3e-05	1.4e-04	2.1e-04
Zn-65	6.6e-03	2.3e-04	3.0e-03	1.8e-02	2.7e-02	1.3e-03	4.6e-05	5.8e-04	3.5e-03	5.3e-03
As-73	4.1e-04	1.5e-05	1.9e-04	1.1e-03	1.7e-03	8.2e-05	2.9e-06	3.6e-05	2.2e-04	3.4e-04
Se-75	4.2e-03	1.5e-04	1.9e-03	1.2e-02	1.7e-02	8.4e-04	3.0e-05	3.8e-04	2.3e-03	3.5e-03
Sr-85	8.7e-04	3.1e-05	3.9e-04	2.4e-03	3.5e-03	1.7e-04	6.1e-06	7.7e-05	4.7e-04	7.0e-04
Sr-89	3.9e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02	7.8e-04	2.7e-05	3.5e-04	2.1e-03	3.2e-03
Sr-90	5.3e-02	1.9e-03	2.4e-02	1.5e-01	2.2e-01	1.0e-02	3.7e-04	4.7e-03	2.9e-02	4.3e-02
Y-91	3.7e-03	1.3e-04	1.7e-03	1.0e-02	1.5e-02	7.3e-04	2.6e-05	3.3e-04	2.0e-03	3.0e-03
Zr-93	4.8e-04	1.7e-05	2.2e-04	1.3e-03	2.0e-03	9.6e-05	3.4e-06	4.3e-05	2.6e-04	3.9e-04
Zr-95	1.5e-03	5.4e-05	6.9e-04	4.3e-03	6.3e-03	3.1e-04	1.1e-05	1.4e-04	8.4e-04	1.3e-03
Nb-93m	2.1e-04	7.3e-06	9.3e-05	5.7e-04	8.5e-04	4.1e-05	1.4e-06	1.8e-05	1.1e-04	1.7e-04
Nb-94	2.9e-03	1.0e-04	1.3e-03	8.1e-03	1.2e-02	5.8e-04	2.1e-05	2.6e-04	1.6e-03	2.4e-03
Nb-95	8.3e-04	2.9e-05	3.7e-04	2.3e-03	3.3e-03	1.6e-04	5.8e-06	7.3e-05	4.5e-04	6.6e-04
Mo-93	4.5e-03	1.6e-04	2.0e-03	1.2e-02	1.8e-02	8.9e-04	3.1e-05	4.0e-04	2.4e-03	3.7e-03
Tc-97	1.4e-04	5.1e-06	6.4e-05	4.0e-04	5.9e-04	2.8e-05	1.0e-06	1.3e-05	7.8e-05	1.2e-04
Tc-97m	1.1e-03	3.7e-05	4.7e-04	2.9e-03	4.3e-03	2.1e-04	7.3e-06	9.3e-05	5.7e-04	8.6e-04
Tc-99	1.3e-03	4.8e-05	6.0e-04	3.7e-03	5.5e-03	2.7e-04	9.4e-06	1.2e-04	7.3e-04	1.1e-03
Ru-103	1.1e-03	3.7e-05	4.8e-04	3.0e-03	4.3e-03	2.1e-04	7.5e-06	9.4e-05	5.8e-04	8.6e-04
Ru-106	1.2e-02	4.2e-04	5.4e-03	3.3e-02	4.8e-02	2.4e-03	8.3e-05	1.1e-03	6.4e-03	9.7e-03
Ag-108m	4.0e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02	7.9e-04	2.8e-05	3.5e-04	2.2e-03	3.2e-03
Ag-110m	4.7e-03	1.7e-04	2.1e-03	1.3e-02	1.9e-02	9.3e-04	3.3e-05	4.2e-04	2.5e-03	3.8e-03
Cd-109	3.4e-03	1.2e-04	1.5e-03	9.4e-03	1.4e-02	6.7e-04	2.4e-05	3.0e-04	1.8e-03	2.8e-03
Sn-113	1.2e-03	4.3e-05	5.6e-04	3.4e-03	5.0e-03	2.4e-04	8.6e-06	1.1e-04	6.7e-04	1.0e-03
Sb-124	3.9e-03	1.4e-04	1.7e-03	1.1e-02	1.6e-02	7.6e-04	2.7e-05	3.4e-04	2.1e-03	3.1e-03
Sb-125	2.2e-03	7.9e-05	1.0e-03	6.1e-03	9.1e-03	4.4e-04	1.6e-05	2.0e-04	1.2e-03	1.8e-03
Te-123m	2.3e-03	8.0e-05	1.0e-03	6.3e-03	9.3e-03	4.5e-04	1.6e-05	2.0e-04	1.2e-03	1.9e-03
Te-127m	4.0e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02	7.9e-04	2.8e-05	3.5e-04	2.2e-03	3.3e-03
I-125	2.3e-02	8.2e-04	1.0e-02	6.4e-02	9.3e-02	4.6e-03	1.6e-04	2.0e-03	1.3e-02	1.9e-02
I-129	1.9e-01	6.7e-03	8.5e-02	5.2e-01	7.8e-01	3.8e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01
I-131	1.7e-02	5.4e-04	7.2e-03	4.6e-02	7.2e-02	3.4e-03	1.1e-04	1.4e-03	9.1e-03	1.4e-02
Cs-134	3.3e-02	1.1e-03	1.5e-02	9.0e-02	1.3e-01	6.4e-03	2.3e-04	2.9e-03	1.8e-02	2.7e-02
Cs-135	3.5e-03	1.2e-04	1.6e-03	9.5e-03	1.4e-02	6.8e-04	2.4e-05	3.1e-04	1.9e-03	2.8e-03
Cs-137	2.2e-02	7.9e-04	1.0e-02	6.2e-02	9.2e-02	4.4e-03	1.6e-04	2.0e-03	1.2e-02	1.8e-02
Ba-133	1.7e-03	6.1e-05	7.7e-04	4.7e-03	7.0e-03	3.4e-04	1.2e-05	1.5e-04	9.3e-04	1.4e-03
Ce-139	4.3e-04	1.5e-05	1.9e-04	1.2e-03	1.7e-03	8.5e-05	3.0e-06	3.8e-05	2.3e-04	3.5e-04
Ce-141	1.0e-03	3.5e-05	4.4e-04	2.8e-03	4.0e-03	2.0e-04	7.0e-06	8.8e-05	5.4e-04	8.0e-04
Ce-144	8.9e-03	3.1e-04	4.0e-03	2.4e-02	3.6e-02	1.8e-03	6.2e-05	7.8e-04	4.8e-03	7.2e-03
Pm-147	4.5e-04	1.6e-05	2.0e-04	1.2e-03	1.8e-03	8.8e-05	3.1e-06	3.9e-05	2.4e-04	3.6e-04

Table F2.4 Normalized effective doses from ingestion: Scrap yard

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-04	6.0e-06	7.6e-05	4.7e-04	6.9e-04	3.4e-05	1.2e-06	1.5e-05	9.2e-05	1.4e-04
Eu-152	2.4e-03	8.5e-05	1.1e-03	6.7e-03	9.9e-03	4.8e-04	1.7e-05	2.1e-04	1.3e-03	2.0e-03
Eu-154	3.4e-03	1.2e-04	1.5e-03	9.5e-03	1.4e-02	6.8e-04	2.4e-05	3.1e-04	1.9e-03	2.8e-03
Eu-155	5.5e-04	1.9e-05	2.5e-04	1.5e-03	2.2e-03	1.1e-04	3.9e-06	4.9e-05	3.0e-04	4.5e-04
Gd-153	4.5e-04	1.6e-05	2.0e-04	1.3e-03	1.9e-03	9.0e-05	3.2e-06	4.0e-05	2.5e-04	3.7e-04
Tb-160	2.5e-03	8.9e-05	1.1e-03	7.0e-03	1.0e-02	5.0e-04	1.8e-05	2.2e-04	1.4e-03	2.0e-03
Tm-170	2.1e-03	7.5e-05	9.6e-04	5.9e-03	8.7e-03	4.2e-04	1.5e-05	1.9e-04	1.2e-03	1.7e-03
Tm-171	1.9e-04	6.6e-06	8.5e-05	5.2e-04	7.7e-04	3.7e-05	1.3e-06	1.7e-05	1.0e-04	1.5e-04
Ta-182	2.4e-03	8.6e-05	1.1e-03	6.8e-03	9.9e-03	4.8e-04	1.7e-05	2.2e-04	1.3e-03	2.0e-03
W-181	1.2e-04	4.4e-06	5.6e-05	3.4e-04	5.1e-04	2.5e-05	8.6e-07	1.1e-05	6.7e-05	1.0e-04
W-185	6.9e-04	2.4e-05	3.1e-04	1.9e-03	2.8e-03	1.4e-04	4.9e-06	6.1e-05	3.8e-04	5.6e-04
Os-185	8.2e-04	2.9e-05	3.7e-04	2.3e-03	3.3e-03	1.6e-04	5.7e-06	7.2e-05	4.5e-04	6.7e-04
Ir-192	2.2e-03	7.8e-05	9.9e-04	6.1e-03	9.0e-03	4.4e-04	1.5e-05	2.0e-04	1.2e-03	1.8e-03
Tl-204	2.2e-03	7.9e-05	1.0e-03	6.2e-03	9.1e-03	4.4e-04	1.6e-05	2.0e-04	1.2e-03	1.8e-03
Pb-210	1.6e+00	5.6e-02	7.1e-01	4.4e+00	6.5e+00	3.1e-01	1.1e-02	1.4e-01	8.6e-01	1.3e+00
Bi-207	2.2e-03	7.9e-05	1.0e-03	6.2e-03	9.2e-03	4.4e-04	1.6e-05	2.0e-04	1.2e-03	1.8e-03
Po-210	3.9e-01	1.4e-02	1.8e-01	1.1e+00	1.6e+00	7.8e-02	2.7e-03	3.5e-02	2.1e-01	3.2e-01
Ra-226	4.9e-01	1.7e-02	2.2e-01	1.3e+00	2.0e+00	9.6e-02	3.4e-03	4.3e-02	2.6e-01	4.0e-01
Ra-228	1.2e+00	4.1e-02	5.2e-01	3.2e+00	4.7e+00	2.3e-01	8.1e-03	1.0e-01	6.3e-01	9.4e-01
Ac-227	2.1e+00	7.4e-02	9.4e-01	5.7e+00	8.5e+00	4.1e-01	1.5e-02	1.8e-01	1.1e+00	1.7e+00
Th-228	2.4e-01	8.5e-03	1.1e-01	6.7e-01	9.9e-01	4.8e-02	1.7e-03	2.1e-02	1.3e-01	2.0e-01
Th-229	1.0e+00	3.7e-02	4.6e-01	2.9e+00	4.2e+00	2.1e-01	7.2e-03	9.2e-02	5.6e-01	8.4e-01
Th-230	3.6e-01	1.3e-02	1.6e-01	1.0e+00	1.5e+00	7.2e-02	2.5e-03	3.2e-02	2.0e-01	3.0e-01
Th-232	3.8e-01	1.4e-02	1.7e-01	1.1e+00	1.6e+00	7.6e-02	2.7e-03	3.4e-02	2.1e-01	3.1e-01
Pa-231	1.2e+00	4.3e-02	5.5e-01	3.4e+00	5.0e+00	2.4e-01	8.6e-03	1.1e-01	6.7e-01	1.0e+00
U-232	5.7e-01	2.0e-02	2.6e-01	1.6e+00	2.3e+00	1.1e-01	4.0e-03	5.1e-02	3.1e-01	4.7e-01
U-233	8.6e-02	3.0e-03	3.9e-02	2.4e-01	3.5e-01	1.7e-02	6.0e-04	7.7e-03	4.7e-02	7.0e-02
U-234	8.5e-02	3.0e-03	3.8e-02	2.3e-01	3.5e-01	1.7e-02	5.9e-04	7.5e-03	4.6e-02	6.9e-02
U-235	8.0e-02	2.8e-03	3.6e-02	2.2e-01	3.3e-01	1.6e-02	5.6e-04	7.1e-03	4.3e-02	6.5e-02
U-236	7.9e-02	2.8e-03	3.6e-02	2.2e-01	3.2e-01	1.6e-02	5.6e-04	7.0e-03	4.3e-02	6.5e-02
U-238	8.2e-02	2.9e-03	3.7e-02	2.3e-01	3.3e-01	1.6e-02	5.7e-04	7.3e-03	4.4e-02	6.7e-02
Np-237	1.9e-01	6.8e-03	8.6e-02	5.3e-01	7.8e-01	3.8e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01
Pu-236	1.5e-01	5.2e-03	6.6e-02	4.1e-01	6.0e-01	2.9e-02	1.0e-03	1.3e-02	8.0e-02	1.2e-01
Pu-238	4.0e-01	1.4e-02	1.8e-01	1.1e+00	1.6e+00	7.9e-02	2.8e-03	3.5e-02	2.2e-01	3.2e-01
Pu-239	4.3e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	8.6e-02	3.0e-03	3.8e-02	2.3e-01	3.5e-01
Pu-240	4.3e-01	1.5e-02	1.9e-01	1.2e+00	1.8e+00	8.6e-02	3.0e-03	3.8e-02	2.3e-01	3.5e-01
Pu-241	8.1e-03	2.9e-04	3.6e-03	2.2e-02	3.3e-02	1.6e-03	5.7e-05	7.2e-04	4.4e-03	6.6e-03
Pu-242	4.1e-01	1.5e-02	1.9e-01	1.1e+00	1.7e+00	8.2e-02	2.9e-03	3.7e-02	2.2e-01	3.4e-01
Pu-244	4.2e-01	1.5e-02	1.9e-01	1.1e+00	1.7e+00	8.2e-02	2.9e-03	3.7e-02	2.3e-01	3.4e-01
Am-241	3.5e-01	1.2e-02	1.6e-01	9.5e-01	1.4e+00	6.8e-02	2.4e-03	3.1e-02	1.9e-01	2.8e-01
Am-242m	3.5e-01	1.2e-02	1.6e-01	9.5e-01	1.4e+00	6.8e-02	2.4e-03	3.1e-02	1.9e-01	2.8e-01
Am-243	3.5e-01	1.2e-02	1.6e-01	9.6e-01	1.4e+00	6.9e-02	2.4e-03	3.1e-02	1.9e-01	2.8e-01
Cm-242	2.0e-02	7.0e-04	9.0e-03	5.5e-02	8.1e-02	4.0e-03	1.4e-04	1.8e-03	1.1e-02	1.6e-02
Cm-243	2.6e-01	9.1e-03	1.2e-01	7.1e-01	1.1e+00	5.1e-02	1.8e-03	2.3e-02	1.4e-01	2.1e-01
Cm-244	2.1e-01	7.3e-03	9.3e-02	5.7e-01	8.5e-01	4.1e-02	1.4e-03	1.8e-02	1.1e-01	1.7e-01
Cm-245	3.6e-01	1.3e-02	1.6e-01	1.0e+00	1.5e+00	7.2e-02	2.5e-03	3.2e-02	2.0e-01	3.0e-01
Cm-246	3.6e-01	1.3e-02	1.6e-01	1.0e+00	1.5e+00	7.2e-02	2.5e-03	3.2e-02	2.0e-01	3.0e-01
Cm-247	3.3e-01	1.2e-02	1.5e-01	9.0e-01	1.3e+00	6.5e-02	2.3e-03	2.9e-02	1.8e-01	2.7e-01
Cm-248	1.3e+00	4.7e-02	6.0e-01	3.7e+00	5.4e+00	2.6e-01	9.3e-03	1.2e-01	7.2e-01	1.1e+00
Bk-249	1.7e-03	5.9e-05	7.5e-04	4.6e-03	6.8e-03	3.3e-04	1.2e-05	1.5e-04	9.1e-04	1.4e-03
Cf-248	4.8e-02	1.7e-03	2.1e-02	1.3e-01	1.9e-01	9.4e-03	3.3e-04	4.2e-03	2.6e-02	3.9e-02
Cf-249	6.0e-01	2.1e-02	2.7e-01	1.7e+00	2.5e+00	1.2e-01	4.2e-03	5.4e-02	3.3e-01	4.9e-01
Cf-250	2.8e-01	9.7e-03	1.2e-01	7.6e-01	1.1e+00	5.5e-02	1.9e-03	2.4e-02	1.5e-01	2.3e-01
Cf-251	6.2e-01	2.2e-02	2.8e-01	1.7e+00	2.5e+00	1.2e-01	4.3e-03	5.5e-02	3.4e-01	5.1e-01
Cf-252	1.5e-01	5.4e-03	6.9e-02	4.3e-01	6.3e-01	3.1e-02	1.1e-03	1.4e-02	8.4e-02	1.3e-01
Cf-254	6.2e-01	2.2e-02	2.8e-01	1.7e+00	2.5e+00	1.2e-01	4.3e-03	5.5e-02	3.4e-01	5.0e-01
Es-254	4.8e-02	1.7e-03	2.2e-02	1.3e-01	2.0e-01	9.5e-03	3.3e-04	4.2e-03	2.6e-02	3.9e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.5 Normalized effective doses from all pathways: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	9.8e+00	1.2e+00	5.5e+00	1.9e+01	3.0e+01	1.9e+00	2.4e-01	1.1e+00	3.7e+00	5.7e+00
P-32	8.5e-03	8.5e-04	3.1e-03	1.4e-02	2.2e-02	1.3e-03	1.3e-04	8.1e-04	2.7e-03	4.3e-03
S-35	4.3e-04	5.3e-05	2.4e-04	8.4e-04	1.3e-03	8.4e-05	1.1e-05	4.8e-05	1.7e-04	2.6e-04
Cl-36	1.7e-03	1.5e-04	8.9e-04	3.5e-03	5.5e-03	3.3e-04	2.9e-05	1.8e-04	6.8e-04	1.1e-03
K-40	7.8e-01	9.7e-02	4.5e-01	1.5e+00	2.3e+00	1.5e-01	1.9e-02	8.8e-02	3.0e-01	4.7e-01
Ca-41	4.4e-04	3.7e-05	2.3e-04	9.1e-04	1.4e-03	8.7e-05	7.2e-06	4.6e-05	1.8e-04	2.8e-04
Ca-45	1.7e-03	2.0e-04	9.5e-04	3.3e-03	5.2e-03	3.3e-04	4.0e-05	1.9e-04	6.5e-04	1.0e-03
Sc-46	1.4e+01	1.8e+00	7.7e+00	2.7e+01	4.1e+01	2.7e+00	3.6e-01	1.5e+00	5.2e+00	8.1e+00
Cr-51	3.9e-02	3.0e-03	1.9e-02	8.2e-02	1.3e-01	7.6e-03	6.0e-04	3.8e-03	1.6e-02	2.5e-02
Mn-53	4.7e-05	4.5e-06	2.6e-05	9.6e-05	1.5e-04	9.3e-06	8.9e-07	5.0e-06	1.9e-05	2.9e-05
Mn-54	8.1e+00	7.5e-01	3.5e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.8e-01	2.3e+00	3.6e+00
Fe-55	1.4e-05	9.9e-07	7.3e-06	3.0e-05	4.8e-05	2.8e-06	2.0e-07	1.4e-06	5.9e-06	9.5e-06
Fe-59	1.6e-01	1.7e-02	9.6e-02	3.6e-01	5.7e-01	3.5e-02	3.4e-03	1.9e-02	7.1e-02	1.1e-01
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.9e+00	3.8e-01	1.8e+00	5.7e+00	8.9e+00	5.7e-01	7.7e-02	3.2e-01	1.1e+00	1.7e+00
Sr-89	1.7e-02	2.3e-03	9.6e-03	3.3e-02	5.2e-02	3.3e-03	4.6e-04	1.9e-03	6.5e-03	1.0e-02
Sr-90	1.1e-01	1.4e-02	6.4e-02	2.1e-01	3.4e-01	2.2e-02	2.8e-03	1.3e-02	4.2e-02	6.6e-02
Y-91	4.2e-02	5.7e-03	2.4e-02	8.2e-02	1.3e-01	8.3e-03	1.1e-03	4.7e-03	1.6e-02	2.5e-02
Zr-93	2.9e-03	3.5e-04	1.6e-03	5.8e-03	8.7e-03	5.7e-04	7.0e-05	3.2e-04	1.1e-03	1.7e-03
Zr-95	6.9e+00	8.7e-01	3.9e+00	1.3e+01	2.1e+01	1.3e+00	1.7e-01	7.7e-01	2.6e+00	4.0e+00
Nb-93m	5.9e-04	7.5e-05	3.4e-04	1.2e-03	1.8e-03	1.2e-04	1.5e-05	6.6e-05	2.3e-04	3.5e-04
Nb-94	1.3e+01	1.7e+00	7.7e+00	2.6e+01	4.1e+01	2.6e+00	3.4e-01	1.5e+00	5.2e+00	8.0e+00
Nb-95	3.5e+00	4.6e-01	2.0e+00	7.0e+00	1.1e+01	6.9e-01	9.2e-02	3.8e-01	1.4e+00	2.2e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.5e-01	2.8e-02	1.8e-01	7.2e-01	1.2e+00	6.8e-02	5.7e-03	3.5e-02	1.4e-01	2.3e-01
Sb-125	1.0e-01	7.9e-03	5.2e-02	2.1e-01	3.3e-01	2.0e-02	1.6e-03	1.0e-02	4.1e-02	6.5e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	6.8e-03	5.5e-04	3.4e-03	1.4e-02	2.2e-02	1.3e-03	1.1e-04	6.7e-04	2.8e-03	4.3e-03
I-129	4.3e-02	2.6e-03	2.0e-02	9.0e-02	1.4e-01	8.4e-03	5.3e-04	4.0e-03	1.8e-02	2.8e-02
I-131	7.8e-02	2.7e-03	2.5e-02	1.7e-01	3.1e-01	1.5e-02	5.3e-04	4.9e-03	3.4e-02	6.0e-02
Cs-134	3.2e-01	2.9e-02	1.6e-01	6.6e-01	1.0e+00	6.2e-02	5.7e-03	3.2e-02	1.3e-01	2.0e-01
Cs-135	7.3e-05	4.5e-06	3.5e-05	1.6e-04	2.4e-04	1.4e-05	8.9e-07	6.9e-06	3.1e-05	4.8e-05
Cs-137	1.2e-01	1.1e-02	6.1e-02	2.4e-01	3.8e-01	2.3e-02	2.1e-03	1.2e-02	4.9e-02	7.5e-02
Ba-133	2.7e+00	3.4e-01	1.5e+00	5.1e+00	8.0e+00	5.3e-01	6.7e-02	3.0e-01	1.0e+00	1.6e+00
Ce-139	7.3e-01	9.5e-02	4.1e-01	1.4e+00	2.2e+00	1.4e-01	1.9e-02	8.2e-02	2.8e-01	4.3e-01
Ce-141	2.2e-01	2.9e-02	1.2e-01	4.4e-01	7.0e-01	4.4e-02	5.7e-03	2.4e-02	8.7e-02	1.4e-01
Ce-144	4.6e-01	6.0e-02	2.6e-01	9.0e-01	1.4e+00	9.1e-02	1.2e-02	5.2e-02	1.8e-01	2.7e-01
Pm-147	1.6e-03	2.0e-04	8.9e-04	3.1e-03	4.9e-03	3.1e-04	3.9e-05	1.8e-04	6.2e-04	9.4e-04

Table F2.5 Normalized effective doses from all pathways: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.1e-03	1.4e-04	6.3e-04	2.3e-03	3.4e-03	2.2e-04	2.7e-05	1.2e-04	4.4e-04	6.7e-04
Eu-152	9.7e+00	1.2e+00	5.5e+00	1.9e+01	2.9e+01	1.9e+00	2.4e-01	1.1e+00	3.7e+00	5.8e+00
Eu-154	1.1e+01	1.3e+00	6.1e+00	2.1e+01	3.2e+01	2.1e+00	2.7e-01	1.2e+00	4.1e+00	6.4e+00
Eu-155	2.4e-01	3.0e-02	1.4e-01	4.6e-01	7.2e-01	4.7e-02	6.0e-03	2.7e-02	9.1e-02	1.4e-01
Gd-153	2.9e-01	3.7e-02	1.6e-01	5.6e-01	8.7e-01	5.6e-02	7.3e-03	3.2e-02	1.1e-01	1.7e-01
Tb-160	7.1e+00	9.4e-01	4.0e+00	1.4e+01	2.2e+01	1.4e+00	1.9e-01	7.9e-01	2.7e+00	4.2e+00
Tm-170	2.1e-02	2.8e-03	1.2e-02	4.0e-02	6.2e-02	4.0e-03	5.5e-04	2.3e-03	7.8e-03	1.2e-02
Tm-171	1.8e-03	2.4e-04	1.0e-03	3.5e-03	5.5e-03	3.6e-04	4.8e-05	2.1e-04	6.9e-04	1.1e-03
Ta-182	9.1e+00	1.2e+00	5.2e+00	1.8e+01	2.8e+01	1.8e+00	2.4e-01	1.0e+00	3.5e+00	5.4e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.7e+01	2.1e+00	9.6e+00	3.2e+01	5.1e+01	3.3e+00	4.3e-01	1.9e+00	6.4e+00	1.0e+01
Ra-228	1.1e+01	1.4e+00	6.1e+00	2.0e+01	3.2e+01	2.1e+00	2.7e-01	1.2e+00	4.0e+00	6.3e+00
Ac-227	2.7e+01	3.4e+00	1.5e+01	5.5e+01	8.3e+01	5.4e+00	6.8e-01	3.0e+00	1.1e+01	1.6e+01
Th-228	2.7e+01	3.6e+00	1.5e+01	5.2e+01	8.1e+01	5.3e+00	7.1e-01	3.0e+00	1.0e+01	1.6e+01
Th-229	2.5e+01	3.1e+00	1.4e+01	5.1e+01	7.7e+01	5.0e+00	6.2e-01	2.8e+00	1.0e+01	1.5e+01
Th-230	2.9e+00	3.5e-01	1.6e+00	5.8e+00	8.8e+00	5.6e-01	6.9e-02	3.2e-01	1.1e+00	1.7e+00
Th-232	4.8e+00	5.8e-01	2.7e+00	9.8e+00	1.5e+01	9.5e-01	1.2e-01	5.3e-01	1.9e+00	2.9e+00
Pa-231	7.8e+00	9.4e-01	4.4e+00	1.6e+01	2.3e+01	1.5e+00	1.9e-01	8.6e-01	3.0e+00	4.6e+00
U-232	1.1e+01	1.3e+00	6.0e+00	2.2e+01	3.3e+01	2.1e+00	2.6e-01	1.2e+00	4.3e+00	6.5e+00
U-233	2.7e+00	3.2e-01	1.5e+00	5.4e+00	8.1e+00	5.2e-01	6.4e-02	2.9e-01	1.1e+00	1.6e+00
U-234	2.6e+00	3.1e-01	1.4e+00	5.3e+00	8.0e+00	5.1e-01	6.3e-02	2.9e-01	1.0e+00	1.6e+00
U-235	3.4e+00	4.3e-01	1.9e+00	6.7e+00	1.0e+01	6.6e-01	8.5e-02	3.8e-01	1.3e+00	2.0e+00
U-236	2.4e+00	2.9e-01	1.3e+00	4.9e+00	7.4e+00	4.8e-01	5.8e-02	2.6e-01	9.5e-01	1.5e+00
U-238	2.4e+00	2.9e-01	1.3e+00	4.9e+00	7.3e+00	4.7e-01	5.9e-02	2.7e-01	9.5e-01	1.4e+00
Np-237	7.4e+00	9.3e-01	4.2e+00	1.5e+01	2.2e+01	1.5e+00	1.9e-01	8.2e-01	2.9e+00	4.4e+00
Pu-236	2.9e+00	3.5e-01	1.6e+00	5.8e+00	8.8e+00	5.7e-01	7.0e-02	3.2e-01	1.1e+00	1.7e+00
Pu-238	4.5e+00	5.4e-01	2.5e+00	9.1e+00	1.4e+01	8.9e-01	1.1e-01	4.9e-01	1.8e+00	2.7e+00
Pu-239	3.5e+00	4.2e-01	1.9e+00	7.1e+00	1.1e+01	6.9e-01	8.5e-02	3.8e-01	1.4e+00	2.1e+00
Pu-240	3.5e+00	4.2e-01	1.9e+00	7.1e+00	1.1e+01	6.9e-01	8.5e-02	3.8e-01	1.4e+00	2.1e+00
Pu-241	4.0e-02	4.7e-03	2.2e-02	7.9e-02	1.2e-01	7.8e-03	9.6e-04	4.4e-03	1.5e-02	2.4e-02
Pu-242	3.3e+00	4.0e-01	1.8e+00	6.6e+00	9.9e+00	6.4e-01	7.9e-02	3.6e-01	1.3e+00	1.9e+00
Pu-244	6.0e+00	7.9e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.6e-01	6.8e-01	2.3e+00	3.6e+00
Am-241	1.1e+01	1.3e+00	5.9e+00	2.2e+01	3.2e+01	2.1e+00	2.6e-01	1.2e+00	4.2e+00	6.4e+00
Am-242m	1.1e+01	1.3e+00	5.9e+00	2.2e+01	3.3e+01	2.1e+00	2.6e-01	1.2e+00	4.3e+00	6.4e+00
Am-243	1.2e+01	1.5e+00	6.6e+00	2.4e+01	3.6e+01	2.3e+00	2.9e-01	1.3e+00	4.6e+00	7.0e+00
Cm-242	1.3e+00	1.6e-01	6.9e-01	2.5e+00	3.8e+00	2.5e-01	3.1e-02	1.4e-01	5.0e-01	7.5e-01
Cm-243	8.6e+00	1.1e+00	4.8e+00	1.7e+01	2.6e+01	1.7e+00	2.1e-01	9.5e-01	3.4e+00	5.1e+00
Cm-244	6.6e+00	7.9e-01	3.7e+00	1.3e+01	2.0e+01	1.3e+00	1.6e-01	7.3e-01	2.6e+00	4.0e+00
Cm-245	1.1e+01	1.3e+00	6.2e+00	2.2e+01	3.4e+01	2.2e+00	2.7e-01	1.2e+00	4.4e+00	6.6e+00
Cm-246	1.1e+01	1.3e+00	5.9e+00	2.2e+01	3.3e+01	2.1e+00	2.5e-01	1.2e+00	4.2e+00	6.4e+00
Cm-247	1.2e+01	1.6e+00	7.0e+00	2.5e+01	3.8e+01	2.4e+00	3.1e-01	1.4e+00	4.8e+00	7.3e+00
Cm-248	3.7e+01	4.5e+00	2.1e+01	7.6e+01	1.1e+02	7.4e+00	9.0e-01	4.1e+00	1.5e+01	2.3e+01
Bk-249	4.0e-02	4.8e-03	2.2e-02	8.2e-02	1.2e-01	7.9e-03	9.7e-04	4.4e-03	1.6e-02	2.4e-02
Cf-248	2.2e+00	2.7e-01	1.2e+00	4.5e+00	6.8e+00	4.4e-01	5.4e-02	2.5e-01	8.9e-01	1.4e+00
Cf-249	2.0e+01	2.5e+00	1.1e+01	4.1e+01	6.1e+01	4.0e+00	5.0e-01	2.2e+00	8.0e+00	1.2e+01
Cf-250	8.6e+00	1.0e+00	4.8e+00	1.7e+01	2.6e+01	1.7e+00	2.1e-01	9.4e-01	3.4e+00	5.2e+00
Cf-251	1.9e+01	2.3e+00	1.0e+01	3.8e+01	5.7e+01	3.7e+00	4.6e-01	2.1e+00	7.5e+00	1.1e+01
Cf-252	5.0e+00	6.0e-01	2.8e+00	1.0e+01	1.5e+01	9.8e-01	1.2e-01	5.4e-01	2.0e+00	3.0e+00
Cf-254	6.2e+00	7.9e-01	3.5e+00	1.2e+01	1.9e+01	1.2e+00	1.6e-01	6.8e-01	2.4e+00	3.8e+00
Es-254	9.3e+00	1.3e+00	5.4e+00	1.8e+01	2.8e+01	1.8e+00	2.5e-01	1.1e+00	3.8e+00	5.6e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.6 Normalized effective doses from external exposure: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	9.8e+00	1.2e+00	5.5e+00	1.9e+01	3.0e+01	1.9e+00	2.4e-01	1.1e+00	3.7e+00	5.7e+00
P-32	5.8e-03	5.8e-04	2.8e-03	1.2e-02	2.0e-02	1.1e-03	1.2e-04	5.5e-04	2.4e-03	3.9e-03
S-35	1.2e-05	1.6e-06	7.1e-06	2.4e-05	3.8e-05	2.5e-06	3.2e-07	1.4e-06	4.7e-06	7.5e-06
Cl-36	9.1e-04	7.6e-05	4.7e-04	1.9e-03	2.9e-03	1.8e-04	1.5e-05	9.2e-05	3.7e-04	5.7e-04
K-40	7.8e-01	9.6e-02	4.4e-01	1.5e+00	2.3e+00	1.5e-01	1.9e-02	8.7e-02	2.9e-01	4.6e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	8.9e-05	8.9e-06	3.9e-05	1.3e-04	2.1e-04	1.3e-05	1.8e-06	7.7e-06	2.6e-05	4.1e-05
Sc-46	1.4e+01	1.8e+00	7.7e+00	2.7e+01	4.1e+01	2.7e+00	3.6e-01	1.5e+00	5.2e+00	8.1e+00
Cr-51	3.9e-02	3.0e-03	1.9e-02	8.2e-02	1.3e-01	7.6e-03	6.0e-04	3.8e-03	1.6e-02	2.5e-02
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	6.1e+00	7.5e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.8e-01	2.3e+00	3.6e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.8e-01	1.7e-02	9.6e-02	3.6e-01	5.7e-01	3.5e-02	3.4e-03	1.9e-02	7.1e-02	1.1e-01
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.9e+00	3.8e-01	1.6e+00	5.7e+00	8.9e+00	5.7e-01	7.7e-02	3.2e-01	1.1e+00	1.7e+00
Sr-89	1.4e-02	1.9e-03	8.1e-03	2.8e-02	4.5e-02	2.8e-03	3.8e-04	1.6e-03	5.6e-03	8.7e-03
Sr-90	8.0e-02	7.6e-03	3.4e-02	1.2e-01	1.8e-01	1.2e-02	1.5e-03	6.7e-03	2.3e-02	3.6e-02
Y-91	3.8e-02	5.1e-03	2.2e-02	7.5e-02	1.2e-01	7.5e-03	1.0e-03	4.3e-03	1.5e-02	2.3e-02
Zr-93	4.0e-07	3.2e-08	2.0e-07	7.9e-07	1.2e-06	7.8e-08	6.4e-09	4.0e-08	1.6e-07	2.4e-07
Zr-95	6.9e+00	8.7e-01	3.9e+00	1.3e+01	2.1e+01	1.3e+00	1.7e-01	7.7e-01	2.6e+00	4.0e+00
Nb-93m	1.1e-04	1.4e-05	6.2e-05	2.1e-04	3.3e-04	2.1e-05	2.7e-06	1.2e-05	4.1e-05	6.5e-05
Nb-94	1.3e+01	1.7e+00	7.7e+00	2.6e+01	4.1e+01	2.6e+00	3.4e-01	1.5e+00	5.2e+00	8.0e+00
Nb-95	3.5e+00	4.6e-01	2.0e+00	7.0e+00	1.1e+01	6.9e-01	9.2e-02	3.8e-01	1.4e+00	2.2e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.5e-01	2.8e-02	1.8e-01	7.2e-01	1.2e+00	6.8e-02	5.7e-03	3.5e-02	1.4e-01	2.3e-01
Sb-125	1.0e-01	7.9e-03	5.2e-02	2.1e-01	3.3e-01	2.0e-02	1.6e-03	1.0e-02	4.1e-02	6.5e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.0e-03	2.6e-04	1.5e-03	6.2e-03	9.8e-03	6.0e-04	5.2e-05	3.0e-04	1.2e-03	1.9e-03
I-129	3.6e-03	2.9e-04	1.8e-03	7.2e-03	1.1e-02	7.0e-04	5.8e-05	3.5e-04	1.4e-03	2.2e-03
I-131	7.8e-02	2.7e-03	2.4e-02	1.7e-01	3.0e-01	1.5e-02	5.2e-04	4.8e-03	3.4e-02	6.0e-02
Cs-134	3.1e-01	2.9e-02	1.6e-01	6.5e-01	1.0e+00	6.2e-02	5.7e-03	3.2e-02	1.3e-01	2.0e-01
Cs-135	1.2e-06	1.1e-07	6.1e-07	2.4e-06	3.8e-06	2.3e-07	2.1e-08	1.2e-07	4.9e-07	7.5e-07
Cs-137	1.2e-01	1.1e-02	6.0e-02	2.4e-01	3.8e-01	2.3e-02	2.1e-03	1.2e-02	4.9e-02	7.4e-02
Ba-133	2.7e+00	3.4e-01	1.5e+00	5.1e+00	8.0e+00	5.2e-01	6.7e-02	3.0e-01	1.0e+00	1.6e+00
Ce-139	7.3e-01	9.5e-02	4.1e-01	1.4e+00	2.2e+00	1.4e-01	1.9e-02	8.2e-02	2.8e-01	4.3e-01
Ce-141	2.2e-01	2.9e-02	1.2e-01	4.4e-01	7.0e-01	4.3e-02	5.7e-03	2.4e-02	8.7e-02	1.4e-01
Ce-144	4.5e-01	5.7e-02	2.5e-01	8.6e-01	1.4e+00	8.8e-02	1.1e-02	5.0e-02	1.7e-01	2.6e-01
Pm-147	6.2e-05	7.8e-06	3.5e-05	1.2e-04	1.9e-04	1.2e-05	1.6e-06	6.9e-06	2.4e-05	3.7e-05

Table F2.6 Normalized effective doses from external exposure: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-06	1.3e-07	5.7e-07	1.9e-06	3.0e-06	2.0e-07	2.5e-08	1.1e-07	3.8e-07	5.9e-07
Eu-152	9.7e+00	1.2e+00	5.5e+00	1.9e+01	2.9e+01	1.9e+00	2.4e-01	1.1e+00	3.7e+00	5.8e+00
Eu-154	1.1e+01	1.3e+00	6.0e+00	2.0e+01	3.2e+01	2.1e+00	2.7e-01	1.2e+00	4.1e+00	6.4e+00
Eu-155	2.4e-01	3.0e-02	1.3e-01	4.5e-01	7.1e-01	4.6e-02	5.9e-03	2.6e-02	9.0e-02	1.4e-01
Gd-153	2.9e-01	3.7e-02	1.6e-01	5.5e-01	8.7e-01	5.6e-02	7.3e-03	3.2e-02	1.1e-01	1.7e-01
Tb-160	7.1e+00	9.4e-01	4.0e+00	1.4e+01	2.2e+01	1.4e+00	1.9e-01	7.9e-01	2.7e+00	4.2e+00
Tm-170	1.7e-02	2.3e-03	9.9e-03	3.4e-02	5.3e-02	3.4e-03	4.6e-04	2.0e-03	6.7e-03	1.0e-02
Tm-171	1.3e-03	1.7e-04	7.6e-04	2.6e-03	4.1e-03	2.6e-04	3.4e-05	1.5e-04	5.2e-04	8.0e-04
Ta-182	9.1e+00	1.2e+00	5.2e+00	1.8e+01	2.8e+01	1.8e+00	2.4e-01	1.0e+00	3.5e+00	5.4e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.6e+01	2.0e+00	8.9e+00	3.0e+01	4.7e+01	3.1e+00	3.9e-01	1.7e+00	6.0e+00	9.3e+00
Ra-228	8.7e+00	1.1e+00	5.0e+00	1.7e+01	2.6e+01	1.7e+00	2.2e-01	9.7e-01	3.3e+00	5.2e+00
Ac-227	2.8e+00	3.5e-01	1.6e+00	5.3e+00	8.3e+00	5.4e-01	6.9e-02	3.1e-01	1.1e+00	1.6e+00
Th-228	1.4e+01	1.7e+00	7.8e+00	2.7e+01	4.2e+01	2.7e+00	3.5e-01	1.5e+00	5.3e+00	8.3e+00
Th-229	2.2e+00	2.7e-01	1.2e+00	4.2e+00	6.6e+00	4.3e-01	5.4e-02	2.4e-01	8.3e-01	1.3e+00
Th-230	2.2e-03	2.6e-04	1.2e-03	4.2e-03	6.6e-03	4.3e-04	5.1e-05	2.4e-04	8.4e-04	1.3e-03
Th-232	9.4e-02	7.4e-03	4.7e-02	1.9e-01	2.9e-01	1.8e-02	1.5e-03	9.4e-03	3.7e-02	5.7e-02
Pa-231	2.7e-01	3.3e-02	1.5e-01	5.2e-01	8.1e-01	5.3e-02	6.6e-03	3.0e-02	1.0e-01	1.6e-01
U-232	4.6e-01	3.7e-02	2.3e-01	9.2e-01	1.4e+00	9.0e-02	7.5e-03	4.6e-02	1.8e-01	2.8e-01
U-233	1.9e-03	2.4e-04	1.1e-03	3.6e-03	5.7e-03	3.7e-04	4.7e-05	2.1e-04	7.2e-04	1.1e-03
U-234	5.1e-04	6.4e-05	2.9e-04	9.8e-04	1.5e-03	1.0e-04	1.3e-05	5.7e-05	1.9e-04	3.0e-04
U-235	1.0e+00	1.3e-01	5.8e-01	2.0e+00	3.1e+00	2.0e-01	2.6e-02	1.1e-01	3.9e-01	6.1e-01
U-236	2.6e-04	3.3e-05	1.5e-04	5.1e-04	7.9e-04	5.2e-05	6.6e-06	2.9e-05	1.0e-04	1.6e-04
U-238	2.0e-01	2.6e-02	1.2e-01	3.9e-01	6.1e-01	4.0e-02	5.1e-03	2.3e-02	7.8e-02	1.2e-01
Np-237	1.5e+00	1.9e-01	8.5e-01	2.9e+00	4.5e+00	2.9e-01	3.7e-02	1.7e-01	5.7e-01	8.9e-01
Pu-236	5.0e-04	4.8e-05	2.6e-04	9.9e-04	1.6e-03	9.9e-05	9.6e-06	5.2e-05	2.0e-04	3.0e-04
Pu-238	1.7e-04	2.2e-05	9.8e-05	3.3e-04	5.2e-04	3.4e-05	4.3e-06	1.9e-05	6.6e-05	1.0e-04
Pu-239	3.9e-04	4.9e-05	2.2e-04	7.5e-04	1.2e-03	7.6e-05	9.8e-06	4.3e-05	1.5e-04	2.3e-04
Pu-240	1.7e-04	2.1e-05	9.4e-05	3.2e-04	5.0e-04	3.3e-05	4.2e-06	1.9e-05	6.4e-05	9.9e-05
Pu-241	1.6e-05	1.7e-06	8.7e-06	3.0e-05	4.8e-05	3.1e-06	3.3e-07	1.7e-06	6.0e-06	9.2e-06
Pu-242	1.5e-04	1.8e-05	8.3e-05	2.8e-04	4.4e-04	2.9e-05	3.7e-06	1.6e-05	5.6e-05	8.7e-05
Pu-244	2.8e+00	3.6e-01	1.6e+00	5.4e+00	8.5e+00	5.6e-01	7.1e-02	3.2e-01	1.1e+00	1.7e+00
Am-241	5.5e-02	6.9e-03	3.1e-02	1.1e-01	1.7e-01	1.1e-02	1.4e-03	6.1e-03	2.1e-02	3.3e-02
Am-242m	9.0e-02	1.1e-02	5.1e-02	1.7e-01	2.7e-01	1.8e-02	2.3e-03	1.0e-02	3.5e-02	5.4e-02
Am-243	1.2e+00	1.5e-01	6.8e-01	2.3e+00	3.6e+00	2.4e-01	3.0e-02	1.3e-01	4.6e-01	7.2e-01
Cm-242	1.7e-04	2.1e-05	9.4e-05	3.2e-04	5.0e-04	3.3e-05	4.3e-06	1.9e-05	6.3e-05	9.8e-05
Cm-243	7.9e-01	9.9e-02	4.5e-01	1.5e+00	2.4e+00	1.5e-01	2.0e-02	8.8e-02	3.0e-01	4.7e-01
Cm-244	1.3e-04	1.7e-05	7.5e-05	2.5e-04	4.0e-04	2.6e-05	3.3e-06	1.5e-05	5.1e-05	7.9e-05
Cm-245	4.5e-01	5.7e-02	2.6e-01	8.7e-01	1.4e+00	8.9e-02	1.1e-02	5.1e-02	1.7e-01	2.7e-01
Cm-246	1.2e-04	1.5e-05	7.0e-05	2.4e-04	3.7e-04	2.4e-05	3.1e-06	1.4e-05	4.7e-05	7.3e-05
Cm-247	2.5e+00	3.2e-01	1.4e+00	4.9e+00	7.7e+00	5.0e-01	6.4e-02	2.8e-01	9.8e-01	1.5e+00
Cm-248	9.2e-05	1.2e-05	5.2e-05	1.8e-04	2.8e-04	1.8e-05	2.3e-06	1.0e-05	3.5e-05	5.5e-05
Bk-249	4.4e-04	3.6e-05	2.2e-04	8.7e-04	1.4e-03	8.6e-05	7.3e-06	4.4e-05	1.7e-04	2.7e-04
Cf-248	1.2e-04	1.5e-05	6.9e-05	2.3e-04	3.7e-04	2.4e-05	3.1e-06	1.4e-05	4.7e-05	7.2e-05
Cf-249	2.5e+00	3.2e-01	1.4e+00	4.9e+00	7.7e+00	5.0e-01	6.4e-02	2.8e-01	9.8e-01	1.5e+00
Cf-250	1.2e-04	1.5e-05	6.9e-05	2.4e-04	3.7e-04	2.4e-05	3.1e-06	1.4e-05	4.7e-05	7.3e-05
Cf-251	7.1e-01	8.9e-02	4.0e-01	1.4e+00	2.1e+00	1.4e-01	1.8e-02	7.9e-02	2.7e-01	4.2e-01
Cf-252	2.0e-04	2.5e-05	1.1e-04	3.8e-04	5.9e-04	3.9e-05	4.9e-06	2.2e-05	7.5e-05	1.2e-04
Cf-254	2.8e-07	3.7e-08	1.6e-07	5.4e-07	8.6e-07	5.5e-08	7.3e-09	3.1e-08	1.1e-07	1.7e-07
Es-254	7.2e+00	9.1e-01	4.1e+00	1.4e+01	2.2e+01	1.4e+00	1.8e-01	8.0e-01	2.7e+00	4.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.7 Normalized effective doses from inhalation: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.9e-04	4.7e-05	2.2e-04	8.0e-04	1.2e-03	7.7e-05	9.4e-06	4.3e-05	1.6e-04	2.4e-04
P-32	8.1e-05	7.9e-06	3.8e-05	1.7e-04	2.8e-04	1.6e-05	1.6e-06	7.6e-06	3.3e-05	5.5e-05
S-35	2.9e-04	3.6e-05	1.6e-04	5.9e-04	9.0e-04	5.7e-05	7.1e-06	3.2e-05	1.1e-04	1.7e-04
Cl-36	4.9e-04	3.9e-05	2.5e-04	1.0e-03	1.6e-03	9.5e-05	7.9e-06	4.9e-05	2.0e-04	3.2e-04
K-40	6.1e-04	7.2e-05	3.4e-04	1.2e-03	1.9e-03	1.2e-04	1.4e-05	6.6e-05	2.4e-04	3.6e-04
Ca-41	7.3e-05	8.7e-06	4.0e-05	1.5e-04	2.2e-04	1.4e-05	1.7e-06	7.9e-06	2.9e-05	4.4e-05
Ca-45	7.7e-04	9.5e-05	4.3e-04	1.5e-03	2.3e-03	1.5e-04	1.9e-05	8.4e-05	3.1e-04	4.6e-04
Sc-46	1.4e-03	1.8e-04	7.8e-04	2.8e-03	4.3e-03	2.8e-04	3.6e-05	1.5e-04	5.6e-04	8.4e-04
Cr-51	2.2e-06	1.6e-07	1.1e-06	4.8e-06	7.5e-06	4.4e-07	3.2e-08	2.2e-07	9.3e-07	1.5e-06
Mn-53	1.3e-05	1.4e-06	7.0e-06	2.5e-05	3.8e-05	2.5e-06	2.9e-07	1.4e-06	4.9e-06	7.5e-06
Mn-54	3.9e-04	4.6e-05	2.2e-04	7.8e-04	1.2e-03	7.7e-05	9.2e-06	4.3e-05	1.5e-04	2.3e-04
Fe-55	3.4e-06	3.0e-07	1.8e-06	6.9e-06	1.1e-05	6.6e-07	5.9e-08	3.6e-07	1.4e-06	2.1e-06
Fe-59	2.0e-05	1.9e-06	1.1e-05	4.1e-05	6.5e-05	4.0e-06	3.9e-07	2.1e-06	8.2e-06	1.3e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.5e-04	1.9e-05	8.4e-05	3.1e-04	4.7e-04	3.0e-05	3.9e-06	1.7e-05	6.0e-05	9.2e-05
Sr-89	3.5e-04	4.4e-05	1.9e-04	7.0e-04	1.1e-03	6.8e-05	9.0e-06	3.8e-05	1.4e-04	2.1e-04
Sr-90	1.2e-02	1.4e-03	6.7e-03	2.4e-02	3.7e-02	2.4e-03	2.9e-04	1.3e-03	4.8e-03	7.3e-03
Y-91	1.6e-03	2.0e-04	8.9e-04	3.2e-03	4.9e-03	3.2e-04	4.1e-05	1.7e-04	6.3e-04	9.7e-04
Zr-93	2.5e-03	3.0e-04	1.4e-03	5.1e-03	7.7e-03	5.0e-04	6.1e-05	2.8e-04	1.0e-03	1.5e-03
Zr-95	1.2e-03	1.5e-04	6.4e-04	2.3e-03	3.6e-03	2.3e-04	2.9e-05	1.3e-04	4.6e-04	6.9e-04
Nb-93m	3.3e-04	3.9e-05	1.8e-04	6.7e-04	1.0e-03	6.5e-05	7.9e-06	3.6e-05	1.3e-04	2.0e-04
Nb-94	9.6e-03	1.1e-03	5.3e-03	1.9e-02	2.9e-02	1.9e-03	2.3e-04	1.0e-03	3.8e-03	5.8e-03
Nb-95	2.7e-04	3.5e-05	1.5e-04	5.4e-04	8.5e-04	5.3e-05	6.8e-06	2.9e-05	1.1e-04	1.6e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.8e-05	3.0e-06	1.9e-05	8.0e-05	1.3e-04	7.5e-06	8.0e-07	3.8e-06	1.6e-05	2.5e-05
Sb-125	4.5e-05	3.4e-06	2.3e-05	9.5e-05	1.5e-04	8.9e-06	6.8e-07	4.5e-06	1.9e-05	3.0e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.8e-04	3.9e-05	2.4e-04	1.0e-03	1.6e-03	9.5e-05	7.7e-06	4.7e-05	2.0e-04	3.1e-04
I-129	4.9e-03	3.8e-04	2.4e-03	1.0e-02	1.6e-02	9.6e-04	7.5e-05	4.8e-04	2.0e-03	3.0e-03
I-131	1.1e-04	3.5e-06	3.4e-05	2.4e-04	4.3e-04	2.2e-05	7.2e-07	6.9e-06	4.7e-05	8.4e-05
Cs-134	8.9e-05	7.9e-06	4.5e-05	1.9e-04	2.9e-04	1.7e-05	1.6e-06	8.9e-06	3.7e-05	5.6e-05
Cs-135	9.4e-06	8.4e-07	4.8e-06	2.0e-05	3.1e-05	1.9e-06	1.7e-07	9.4e-07	3.9e-06	6.0e-06
Cs-137	6.4e-05	5.7e-06	3.2e-05	1.3e-04	2.1e-04	1.2e-05	1.1e-06	6.4e-06	2.6e-05	4.0e-05
Ba-133	6.9e-04	8.2e-05	3.8e-04	1.4e-03	2.1e-03	1.3e-04	1.6e-05	7.5e-05	2.7e-04	4.1e-04
Ce-139	4.6e-04	5.7e-05	2.5e-04	9.2e-04	1.4e-03	9.0e-05	1.1e-05	5.0e-05	1.8e-04	2.7e-04
Ce-141	6.1e-04	7.9e-05	3.3e-04	1.2e-03	1.9e-03	1.2e-04	1.6e-05	6.6e-05	2.4e-04	3.8e-04
Ce-144	1.0e-02	1.3e-03	5.7e-03	2.1e-02	3.1e-02	2.0e-03	2.5e-04	1.1e-03	4.1e-03	6.2e-03
Pm-147	1.2e-03	1.4e-04	6.6e-04	2.4e-03	3.6e-03	2.4e-04	2.9e-05	1.3e-04	4.8e-04	7.2e-04

Table F2.7 Normalized effective doses from inhalation: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-03	1.2e-04	5.5e-04	2.0e-03	3.0e-03	2.0e-04	2.4e-05	1.1e-04	4.0e-04	6.0e-04
Eu-152	1.0e-02	1.2e-03	5.7e-03	2.1e-02	3.1e-02	2.0e-03	2.5e-04	1.1e-03	4.1e-03	6.2e-03
Eu-154	1.3e-02	1.6e-03	7.4e-03	2.7e-02	4.1e-02	2.6e-03	3.2e-04	1.5e-03	5.3e-03	8.0e-03
Eu-155	1.8e-03	2.1e-04	9.8e-04	3.6e-03	5.4e-03	3.5e-04	4.3e-05	1.9e-04	7.1e-04	1.1e-03
Gd-153	4.9e-04	6.0e-05	2.7e-04	9.8e-04	1.5e-03	9.6e-05	1.2e-05	5.3e-05	1.9e-04	2.9e-04
Tb-160	1.5e-03	1.9e-04	8.5e-04	3.1e-03	4.7e-03	3.0e-04	3.9e-05	1.7e-04	6.0e-04	9.1e-04
Tm-170	1.7e-03	2.1e-04	9.3e-04	3.4e-03	5.1e-03	3.3e-04	4.2e-05	1.8e-04	6.7e-04	1.0e-03
Tm-171	3.4e-04	4.1e-05	1.9e-04	6.9e-04	1.0e-03	6.6e-05	8.1e-06	3.7e-05	1.3e-04	2.0e-04
Ta-182	2.3e-03	2.9e-04	1.3e-03	4.7e-03	7.1e-03	4.6e-04	5.8e-05	2.5e-04	9.2e-04	1.4e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	8.6e-01	1.0e-01	4.7e-01	1.7e+00	2.6e+00	1.7e-01	2.1e-02	9.4e-02	3.4e-01	5.2e-01
Ra-228	1.1e+00	1.2e-01	5.8e-01	2.2e+00	3.3e+00	2.1e-01	2.3e-02	1.2e-01	4.3e-01	6.4e-01
Ac-227	2.3e+01	2.7e+00	1.3e+01	4.6e+01	7.0e+01	4.5e+00	5.5e-01	2.5e+00	9.2e+00	1.4e+01
Th-228	1.3e+01	1.5e+00	7.1e+00	2.6e+01	3.9e+01	2.5e+00	3.1e-01	1.4e+00	5.1e+00	7.7e+00
Th-229	2.3e+01	2.7e+00	1.3e+01	4.6e+01	6.9e+01	4.5e+00	5.4e-01	2.5e+00	9.1e+00	1.4e+01
Th-230	2.8e+00	3.3e-01	1.5e+00	5.6e+00	8.4e+00	5.4e-01	6.6e-02	3.0e-01	1.1e+00	1.7e+00
Th-232	4.6e+00	5.5e-01	2.6e+00	9.3e+00	1.4e+01	9.1e-01	1.1e-01	5.0e-01	1.8e+00	2.8e+00
Pa-231	6.6e+00	7.9e-01	3.6e+00	1.3e+01	2.0e+01	1.3e+00	1.6e-01	7.2e-01	2.6e+00	4.0e+00
U-232	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.2e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.2e+00
U-233	2.6e+00	3.2e-01	1.5e+00	5.3e+00	8.1e+00	5.2e-01	6.3e-02	2.9e-01	1.1e+00	1.5e+00
U-234	2.6e+00	3.1e-01	1.4e+00	5.3e+00	7.9e+00	5.1e-01	6.2e-02	2.8e-01	1.0e+00	1.6e+00
U-235	2.3e+00	2.8e-01	1.3e+00	4.7e+00	7.1e+00	4.6e-01	5.6e-02	2.6e-01	9.3e-01	1.4e+00
U-236	2.4e+00	2.9e-01	1.3e+00	4.9e+00	7.4e+00	4.7e-01	5.8e-02	2.6e-01	9.6e-01	1.5e+00
U-238	2.2e+00	2.6e-01	1.2e+00	4.4e+00	6.7e+00	4.3e-01	5.2e-02	2.4e-01	8.7e-01	1.3e+00
Np-237	5.1e+00	6.9e-01	3.2e+00	1.2e+01	1.8e+01	1.1e+00	1.4e-01	6.3e-01	2.3e+00	3.5e+00
Pu-236	2.8e+00	3.3e-01	1.5e+00	5.6e+00	8.5e+00	5.5e-01	6.7e-02	3.0e-01	1.1e+00	1.7e+00
Pu-238	4.2e+00	5.0e-01	2.3e+00	8.5e+00	1.3e+01	8.3e-01	1.0e-01	4.6e-01	1.7e+00	2.5e+00
Pu-239	3.2e+00	3.8e-01	1.8e+00	6.5e+00	9.7e+00	6.3e-01	7.6e-02	3.5e-01	1.3e+00	1.9e+00
Pu-240	3.2e+00	3.8e-01	1.8e+00	6.5e+00	9.7e+00	6.3e-01	7.6e-02	3.5e-01	1.3e+00	1.9e+00
Pu-241	3.4e-02	3.9e-03	1.9e-02	6.8e-02	1.0e-01	6.6e-03	8.0e-04	3.7e-03	1.3e-02	2.0e-02
Pu-242	3.0e+00	3.5e-01	1.6e+00	6.0e+00	9.0e+00	5.8e-01	7.1e-02	3.2e-01	1.2e+00	1.8e+00
Pu-244	2.8e+00	3.4e-01	1.6e+00	5.8e+00	8.7e+00	5.6e-01	6.8e-02	3.1e-01	1.1e+00	1.7e+00
Am-241	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.1e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.2e+00
Am-242m	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.1e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Am-243	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.1e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.2e+00
Cm-242	1.2e+00	1.5e-01	6.8e-01	2.5e+00	3.8e+00	2.4e-01	3.1e-02	1.4e-01	4.9e-01	7.4e-01
Cm-243	7.7e+00	9.1e-01	4.2e+00	1.6e+01	2.3e+01	1.5e+00	1.8e-01	8.4e-01	3.0e+00	4.6e+00
Cm-244	6.5e+00	7.8e-01	3.6e+00	1.3e+01	2.0e+01	1.3e+00	1.6e-01	7.1e-01	2.6e+00	3.9e+00
Cm-245	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.1e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.2e+00
Cm-248	1.0e+01	1.2e+00	5.7e+00	2.1e+01	3.1e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.2e+00
Cm-247	9.6e+00	1.1e+00	5.3e+00	2.0e+01	2.9e+01	1.9e+00	2.3e-01	1.0e+00	3.8e+00	5.8e+00
Cm-248	3.6e+01	4.3e+00	2.0e+01	7.4e+01	1.1e+02	7.2e+00	8.7e-01	4.0e+00	1.5e+01	2.2e+01
Bk-249	3.9e-02	4.6e-03	2.1e-02	7.9e-02	1.2e-01	7.6e-03	9.3e-04	4.2e-03	1.5e-02	2.3e-02
Cf-248	2.2e+00	2.7e-01	1.2e+00	4.4e+00	6.7e+00	4.3e-01	5.3e-02	2.4e-01	8.8e-01	1.3e+00
Cf-249	1.7e+01	2.1e+00	9.5e+00	3.5e+01	5.2e+01	3.4e+00	4.1e-01	1.9e+00	6.8e+00	1.0e+01
Cf-250	8.4e+00	1.0e+00	4.7e+00	1.7e+01	2.5e+01	1.6e+00	2.0e-01	9.2e-01	3.3e+00	5.0e+00
Cf-251	1.8e+01	2.1e+00	9.8e+00	3.6e+01	5.4e+01	3.5e+00	4.2e-01	1.9e+00	7.0e+00	1.1e+01
Cf-252	4.9e+00	5.9e-01	2.7e+00	9.8e+00	1.5e+01	9.6e-01	1.2e-01	5.3e-01	1.9e+00	2.9e+00
Cf-254	5.8e+00	7.4e-01	3.2e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.4e-01	2.3e+00	3.5e+00
Es-254	2.2e+00	2.6e-01	1.2e+00	4.4e+00	6.5e+00	4.2e-01	5.3e-02	2.4e-01	8.6e-01	1.3e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.8 Normalized effective doses from ingestion: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.1e-03	8.6e-05	1.1e-03	4.4e-03	6.8e-03	4.1e-04	1.7e-05	2.1e-04	8.6e-04	1.3e-03
P-32	5.9e-04	2.0e-05	2.4e-04	1.3e-03	2.1e-03	1.2e-04	3.9e-06	4.8e-05	2.5e-04	4.2e-04
S-35	1.2e-04	5.1e-06	6.3e-05	2.6e-04	4.0e-04	2.4e-05	1.0e-06	1.2e-05	5.1e-05	8.0e-05
Cl-36	2.9e-04	8.6e-06	1.3e-04	6.5e-04	1.0e-03	5.8e-05	1.7e-06	2.6e-05	1.3e-04	2.0e-04
K-40	4.2e-03	1.7e-04	2.1e-03	8.7e-03	1.3e-02	8.2e-04	3.4e-05	4.2e-04	1.7e-03	2.7e-03
Ca-41	3.7e-04	1.5e-05	1.9e-04	7.8e-04	1.2e-03	7.2e-05	3.0e-06	3.7e-05	1.5e-04	2.4e-04
Ca-45	8.4e-04	3.5e-05	4.3e-04	1.8e-03	2.7e-03	1.7e-04	7.0e-06	8.5e-05	3.5e-04	5.4e-04
Sc-46	1.5e-03	6.2e-05	7.5e-04	3.1e-03	4.8e-03	2.9e-04	1.2e-05	1.5e-04	6.1e-04	9.4e-04
Cr-51	7.9e-06	2.1e-07	3.4e-06	1.7e-05	2.8e-05	1.5e-06	4.2e-08	6.7e-07	3.3e-06	5.5e-06
Mn-53	3.5e-05	1.4e-06	1.8e-05	7.4e-05	1.1e-04	6.8e-06	2.8e-07	3.5e-06	1.5e-05	2.2e-05
Mn-54	7.6e-04	3.2e-05	3.9e-04	1.6e-03	2.5e-03	1.5e-04	6.3e-06	7.7e-05	3.2e-04	4.9e-04
Fe-55	1.1e-05	3.7e-07	5.2e-06	2.4e-05	3.8e-05	2.2e-06	7.4e-08	1.0e-06	4.7e-06	7.7e-06
Fe-59	3.8e-05	1.3e-06	1.8e-05	8.2e-05	1.3e-04	7.5e-06	2.6e-07	3.5e-06	1.6e-05	2.5e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	5.1e-04	2.1e-05	2.6e-04	1.1e-03	1.7e-03	9.9e-05	4.3e-06	5.1e-05	2.1e-04	3.3e-04
Sr-89	2.1e-03	9.2e-05	1.1e-03	4.5e-03	7.0e-03	4.2e-04	1.8e-05	2.2e-04	8.9e-04	1.4e-03
Sr-90	3.9e-02	1.6e-03	2.0e-02	8.2e-02	1.3e-01	7.6e-03	3.2e-04	3.9e-03	1.6e-02	2.5e-02
Y-91	2.1e-03	8.8e-05	1.1e-03	4.4e-03	6.8e-03	4.1e-04	1.8e-05	2.1e-04	8.7e-04	1.4e-03
Zr-93	3.6e-04	1.5e-05	1.8e-04	7.5e-04	1.1e-03	7.0e-05	2.9e-06	3.6e-05	1.5e-04	2.3e-04
Zr-95	1.1e-03	4.5e-05	5.5e-04	2.3e-03	3.5e-03	2.1e-04	8.8e-06	1.1e-04	4.4e-04	6.9e-04
Nb-93m	1.5e-04	6.2e-06	7.8e-05	3.2e-04	4.9e-04	3.0e-05	1.2e-06	1.5e-05	6.3e-05	9.7e-05
Nb-94	2.2e-03	8.9e-05	1.1e-03	4.6e-03	7.0e-03	4.2e-04	1.8e-05	2.2e-04	9.0e-04	1.4e-03
Nb-95	4.0e-04	1.7e-05	2.0e-04	8.3e-04	1.3e-03	7.8e-05	3.4e-06	4.0e-05	1.7e-04	2.7e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	6.7e-05	2.1e-06	3.0e-05	1.5e-04	2.4e-04	1.3e-05	4.0e-07	5.9e-06	2.9e-05	4.7e-05
Sb-125	4.9e-05	1.5e-06	2.2e-05	1.1e-04	1.7e-04	9.6e-06	2.9e-07	4.4e-06	2.1e-05	3.4e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.3e-03	1.0e-04	1.5e-03	7.1e-03	1.1e-02	6.4e-04	2.0e-05	2.9e-04	1.4e-03	2.2e-03
I-129	3.5e-02	1.0e-03	1.6e-02	7.4e-02	1.2e-01	6.8e-03	2.1e-04	3.1e-03	1.5e-02	2.3e-02
I-131	7.3e-04	1.0e-05	1.9e-04	1.6e-03	2.9e-03	1.4e-04	2.0e-06	3.8e-05	3.2e-04	5.8e-04
Cs-134	5.8e-04	1.9e-05	2.7e-04	1.3e-03	2.0e-03	1.1e-04	3.7e-06	5.2e-05	2.5e-04	3.9e-04
Cs-135	8.3e-05	2.0e-06	2.9e-05	1.4e-04	2.2e-04	1.2e-05	4.1e-07	5.7e-06	2.7e-05	4.2e-05
Cs-137	4.1e-04	1.3e-05	1.9e-04	8.9e-04	1.4e-03	8.0e-05	2.6e-06	3.7e-05	1.7e-04	2.7e-04
Ba-133	1.3e-03	5.2e-05	6.5e-04	2.7e-03	4.1e-03	2.5e-04	1.0e-05	1.3e-04	5.2e-04	8.1e-04
Ce-139	2.8e-04	1.2e-05	1.4e-04	6.0e-04	9.2e-04	5.5e-05	2.3e-06	2.8e-05	1.2e-04	1.8e-04
Ce-141	4.7e-04	2.0e-05	2.3e-04	9.7e-04	1.6e-03	9.2e-05	3.9e-06	4.6e-05	1.9e-04	3.1e-04
Ce-144	6.2e-03	2.6e-04	3.2e-03	1.3e-02	2.0e-02	1.2e-03	5.1e-05	6.2e-04	2.6e-03	4.0e-03
Pm-147	3.2e-04	1.3e-05	1.7e-04	6.8e-04	1.0e-03	6.3e-05	2.6e-06	3.2e-05	1.3e-04	2.1e-04

Table F2.8 Normalized effective doses from ingestion: Handling slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.2e-04	5.1e-06	6.4e-05	2.6e-04	4.0e-04	2.4e-05	1.0e-06	1.3e-05	5.2e-05	8.0e-05
Eu-152	1.8e-03	7.2e-05	9.1e-04	3.7e-03	5.7e-03	3.5e-04	1.4e-05	1.8e-04	7.4e-04	1.1e-03
Eu-154	2.5e-03	1.0e-04	1.3e-03	5.3e-03	8.1e-03	4.9e-04	2.1e-05	2.5e-04	1.1e-03	1.6e-03
Eu-155	4.0e-04	1.6e-05	2.1e-04	8.5e-04	1.3e-03	7.9e-05	3.3e-06	4.0e-05	1.7e-04	2.6e-04
Gd-153	3.1e-04	1.3e-05	1.6e-04	6.6e-04	1.0e-03	6.1e-05	2.6e-06	3.2e-05	1.3e-04	2.0e-04
Tb-160	1.5e-03	6.3e-05	7.7e-04	3.2e-03	4.9e-03	2.9e-04	1.3e-05	1.5e-04	6.2e-04	9.6e-04
Tm-170	1.4e-03	5.8e-05	7.1e-04	3.0e-03	4.5e-03	2.7e-04	1.1e-05	1.4e-04	5.8e-04	8.9e-04
Tm-171	1.4e-04	5.6e-06	7.0e-05	2.9e-04	4.4e-04	2.7e-05	1.1e-06	1.4e-05	5.6e-05	8.7e-05
Ta-182	1.6e-03	6.6e-05	8.0e-04	3.3e-03	5.2e-03	3.1e-04	1.3e-05	1.6e-04	6.5e-04	1.0e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.6e-01	1.5e-02	1.8e-01	7.6e-01	1.2e+00	7.0e-02	2.9e-03	3.6e-02	1.5e-01	2.3e-01
Ra-228	8.5e-01	3.4e-02	4.4e-01	1.8e+00	2.7e+00	1.7e-01	6.9e-03	8.5e-02	3.5e-01	5.4e-01
Ac-227	1.5e+00	6.3e-02	7.9e-01	3.2e+00	4.9e+00	3.0e-01	1.3e-02	1.5e-01	6.4e-01	9.9e-01
Th-228	1.3e-01	5.4e-03	6.7e-02	2.8e-01	4.2e-01	2.6e-02	1.1e-03	1.3e-02	5.5e-02	8.4e-02
Th-229	4.0e-01	1.7e-02	2.1e-01	8.6e-01	1.3e+00	7.9e-02	3.3e-03	4.1e-02	1.7e-01	2.6e-01
Th-230	1.1e-01	4.5e-03	5.7e-02	2.3e-01	3.6e-01	2.2e-02	9.1e-04	1.1e-02	4.6e-02	7.1e-02
Th-232	1.3e-01	5.0e-03	6.4e-02	2.6e-01	4.1e-01	2.5e-02	1.0e-03	1.3e-02	5.2e-02	8.0e-02
Pa-231	9.0e-01	3.7e-02	4.7e-01	1.9e+00	2.9e+00	1.8e-01	7.4e-03	9.1e-02	3.8e-01	5.8e-01
U-232	5.1e-02	2.0e-03	2.6e-02	1.1e-01	1.7e-01	1.0e-02	4.1e-04	5.1e-03	2.1e-02	3.3e-02
U-233	1.1e-02	4.4e-04	5.5e-03	2.3e-02	3.5e-02	2.1e-03	8.8e-05	1.1e-03	4.5e-03	6.9e-03
U-234	1.1e-02	4.3e-04	5.4e-03	2.2e-02	3.4e-02	2.1e-03	8.6e-05	1.1e-03	4.4e-03	6.7e-03
U-235	1.1e-02	4.5e-04	5.6e-03	2.3e-02	3.5e-02	2.2e-03	8.9e-05	1.1e-03	4.6e-03	7.0e-03
U-236	1.0e-02	4.1e-04	5.1e-03	2.1e-02	3.3e-02	2.0e-03	8.1e-05	1.0e-03	4.2e-03	6.4e-03
U-238	1.4e-02	5.7e-04	7.1e-03	3.0e-02	4.5e-02	2.7e-03	1.1e-04	1.4e-03	5.8e-03	8.9e-03
Np-237	1.4e-01	5.7e-03	7.2e-02	3.0e-01	4.5e-01	2.8e-02	1.2e-03	1.4e-02	5.8e-02	9.0e-02
Pu-236	1.1e-01	4.4e-03	5.5e-02	2.3e-01	3.4e-01	2.1e-02	8.8e-04	1.1e-02	4.5e-02	6.9e-02
Pu-238	2.9e-01	1.2e-02	1.5e-01	6.1e-01	9.4e-01	5.7e-02	2.4e-03	2.9e-02	1.2e-01	1.9e-01
Pu-239	3.2e-01	1.3e-02	1.6e-01	6.7e-01	1.0e+00	6.2e-02	2.6e-03	3.2e-02	1.3e-01	2.0e-01
Pu-240	3.2e-01	1.3e-02	1.6e-01	6.7e-01	1.0e+00	6.2e-02	2.6e-03	3.2e-02	1.3e-01	2.0e-01
Pu-241	6.0e-03	2.5e-04	3.1e-03	1.3e-02	1.9e-02	1.2e-03	4.9e-05	6.0e-04	2.5e-03	3.8e-03
Pu-242	3.0e-01	1.3e-02	1.6e-01	6.4e-01	9.8e-01	6.0e-02	2.5e-03	3.1e-02	1.3e-01	2.0e-01
Pu-244	3.1e-01	1.3e-02	1.6e-01	6.4e-01	9.9e-01	6.0e-02	2.5e-03	3.1e-02	1.3e-01	2.0e-01
Am-241	2.5e-01	1.0e-02	1.3e-01	5.3e-01	8.2e-01	5.0e-02	2.1e-03	2.6e-02	1.1e-01	1.6e-01
Am-242m	2.5e-01	1.0e-02	1.3e-01	5.3e-01	8.2e-01	5.0e-02	2.1e-03	2.6e-02	1.1e-01	1.6e-01
Am-243	2.5e-01	1.0e-02	1.3e-01	5.4e-01	8.3e-01	5.0e-02	2.1e-03	2.6e-02	1.1e-01	1.6e-01
Cm-242	1.3e-02	5.6e-04	6.9e-03	2.9e-02	4.4e-02	2.6e-03	1.1e-04	1.4e-03	5.6e-03	8.7e-03
Cm-243	1.9e-01	7.8e-03	9.8e-02	4.0e-01	6.1e-01	3.7e-02	1.6e-03	1.9e-02	7.9e-02	1.2e-01
Cm-244	1.5e-01	6.2e-03	7.8e-02	3.2e-01	4.9e-01	3.0e-02	1.2e-03	1.5e-02	6.3e-02	9.7e-02
Cm-245	2.7e-01	1.1e-02	1.4e-01	5.6e-01	8.6e-01	5.2e-02	2.2e-03	2.7e-02	1.1e-01	1.7e-01
Cm-246	2.7e-01	1.1e-02	1.4e-01	5.6e-01	8.6e-01	5.2e-02	2.2e-03	2.7e-02	1.1e-01	1.7e-01
Cm-247	2.4e-01	9.8e-03	1.2e-01	5.1e-01	7.8e-01	4.7e-02	2.0e-03	2.4e-02	1.0e-01	1.5e-01
Cm-248	9.8e-01	4.0e-02	5.0e-01	2.1e+00	3.2e+00	1.9e-01	8.0e-03	9.9e-02	4.1e-01	6.3e-01
Bk-249	1.2e-03	5.0e-05	6.3e-04	2.6e-03	4.0e-03	2.4e-04	1.0e-05	1.2e-04	5.1e-04	7.8e-04
Cf-248	3.4e-02	1.4e-03	1.7e-02	7.1e-02	1.1e-01	6.6e-03	2.8e-04	3.4e-03	1.4e-02	2.2e-02
Cf-249	4.4e-01	1.8e-02	2.3e-01	9.4e-01	1.4e+00	8.7e-02	3.6e-03	4.5e-02	1.8e-01	2.8e-01
Cf-250	2.0e-01	8.2e-03	1.0e-01	4.3e-01	6.5e-01	4.0e-02	1.7e-03	2.0e-02	8.4e-02	1.3e-01
Cf-251	4.6e-01	1.9e-02	2.4e-01	9.6e-01	1.5e+00	9.0e-02	3.7e-03	4.6e-02	1.9e-01	2.9e-01
Cf-252	1.1e-01	4.6e-03	5.7e-02	2.4e-01	3.6e-01	2.2e-02	9.1e-04	1.1e-02	4.6e-02	7.2e-02
Cf-254	3.5e-01	1.5e-02	1.8e-01	7.5e-01	1.2e+00	6.9e-02	3.0e-03	3.6e-02	1.5e-01	2.3e-01
Es-254	3.4e-02	1.4e-03	1.7e-02	7.2e-02	1.1e-01	6.6e-03	2.8e-04	3.4e-03	1.4e-02	2.2e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.9 Normalized effective doses from all pathways: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.6e+01	1.0e+01	1.6e+01	2.2e+01	2.3e+01	3.2e+00	2.1e+00	3.1e+00	4.2e+00	4.5e+00
P-32	3.6e-04	8.9e-05	2.8e-04	7.3e-04	8.9e-04	7.1e-05	1.8e-05	5.6e-05	1.4e-04	1.7e-04
S-35	3.8e-05	1.4e-05	3.4e-05	6.2e-05	7.3e-05	7.4e-06	2.8e-06	6.7e-06	1.2e-05	1.4e-05
Cl-36	3.6e-03	9.9e-04	3.3e-03	6.4e-03	7.5e-03	7.2e-04	2.0e-04	6.5e-04	1.3e-03	1.5e-03
K-40	1.3e+00	8.2e-01	1.3e+00	1.8e+00	1.9e+00	2.6e-01	1.7e-01	2.5e-01	3.4e-01	3.7e-01
Ca-41	5.8e-05	1.2e-05	5.2e-05	1.1e-04	1.2e-04	1.1e-05	2.5e-06	1.0e-05	2.1e-05	2.4e-05
Ca-45	2.1e-04	7.9e-05	2.0e-04	3.5e-04	4.1e-04	4.2e-05	1.6e-05	3.9e-05	6.9e-05	7.9e-05
Sc-46	1.2e+00	8.2e-01	1.1e+00	1.8e+00	2.0e+00	2.4e-01	1.3e-01	2.2e-01	3.5e-01	3.9e-01
Cr-51	3.9e-03	1.4e-03	3.4e-03	6.7e-03	7.9e-03	7.6e-04	2.9e-04	6.8e-04	1.3e-03	1.5e-03
Mn-53	5.0e-06	1.5e-06	4.7e-06	8.5e-06	9.7e-06	9.8e-07	3.0e-07	9.3e-07	1.7e-06	1.9e-06
Mn-54	4.3e-01	2.6e-01	4.2e-01	5.8e-01	6.2e-01	8.4e-02	5.5e-02	8.3e-02	1.1e-01	1.2e-01
Fe-55	1.8e-05	4.4e-06	1.6e-05	3.4e-05	4.0e-05	3.6e-06	8.9e-07	3.2e-06	6.6e-06	7.8e-06
Fe-59	1.5e-01	6.5e-02	1.4e-01	2.5e-01	2.8e-01	3.0e-02	1.3e-02	2.8e-02	4.8e-02	5.4e-02
Co-56	5.6e-01	2.6e-01	5.3e-01	8.9e-01	9.9e-01	1.1e-01	5.2e-02	1.0e-01	1.7e-01	1.9e-01
Co-57	5.7e-03	2.7e-03	5.3e-03	8.8e-03	9.8e-03	1.1e-03	5.4e-04	1.1e-03	1.7e-03	1.9e-03
Co-58	1.4e-01	6.2e-02	1.3e-01	2.2e-01	2.4e-01	2.7e-02	1.3e-02	2.5e-02	4.2e-02	4.7e-02
Co-60	5.2e-01	2.5e-01	4.9e-01	8.1e-01	8.9e-01	1.0e-01	5.0e-02	9.8e-02	1.6e-01	1.7e-01
Ni-59	6.8e-06	2.8e-06	6.3e-06	1.1e-05	1.3e-05	1.3e-06	5.6e-07	1.2e-06	2.2e-06	2.5e-06
Ni-63	1.1e-05	3.3e-06	9.6e-06	1.9e-05	2.2e-05	2.1e-06	6.8e-07	1.9e-06	3.7e-06	4.3e-06
Zn-65	7.8e+00	4.9e+00	7.7e+00	1.1e+01	1.1e+01	1.5e+00	1.0e+00	1.5e+00	2.0e+00	2.1e+00
As-73	1.1e-03	4.5e-04	1.0e-03	1.7e-03	1.9e-03	2.1e-04	9.2e-05	2.0e-04	3.2e-04	3.7e-04
Se-75	2.6e+00	1.6e+00	2.6e+00	3.5e+00	3.8e+00	5.2e-01	3.4e-01	5.1e-01	6.8e-01	7.3e-01
Sr-85	2.3e-01	1.2e-01	2.2e-01	3.4e-01	3.9e-01	4.5e-02	2.4e-02	4.3e-02	6.7e-02	7.5e-02
Sr-89	1.2e-03	5.5e-04	1.1e-03	1.8e-03	2.1e-03	2.3e-04	1.1e-04	2.2e-04	3.5e-04	4.0e-04
Sr-90	1.1e-02	4.5e-03	9.8e-03	1.7e-02	1.9e-02	2.1e-03	9.2e-04	2.0e-03	3.3e-03	3.8e-03
Y-91	3.4e-03	1.7e-03	3.2e-03	5.2e-03	5.8e-03	6.7e-04	3.5e-04	6.4e-04	1.0e-03	1.1e-03
Zr-93	3.8e-04	1.7e-04	3.5e-04	6.0e-04	7.0e-04	7.4e-05	3.4e-05	6.8e-05	1.2e-04	1.4e-04
Zr-95	5.9e-01	3.1e-01	5.7e-01	8.5e-01	9.5e-01	1.2e-01	6.4e-02	1.1e-01	1.7e-01	1.8e-01
Nb-93m	6.2e-05	2.7e-05	5.7e-05	9.9e-05	1.1e-04	1.2e-05	5.4e-06	1.1e-05	1.9e-05	2.2e-05
Nb-94	1.1e+00	6.2e-01	1.1e+00	1.7e+00	1.9e+00	2.3e-01	1.2e-01	2.2e-01	3.3e-01	3.6e-01
Nb-95	3.0e-01	1.3e-01	2.8e-01	4.9e-01	5.6e-01	6.0e-02	2.7e-02	5.5e-02	9.5e-02	1.1e-01
Mo-93	1.3e-04	2.3e-05	1.1e-04	2.5e-04	2.9e-04	2.6e-05	4.7e-06	2.3e-05	4.9e-05	5.8e-05
Tc-97	5.8e-06	1.8e-06	5.1e-06	1.0e-05	1.2e-05	1.1e-06	3.5e-07	1.0e-06	2.0e-06	2.4e-06
Tc-97m	5.8e-05	2.2e-05	5.2e-05	9.6e-05	1.1e-04	1.1e-05	4.5e-06	1.0e-05	1.9e-05	2.2e-05
Tc-99	7.9e-05	3.0e-05	7.2e-05	1.3e-04	1.6e-04	1.6e-05	5.9e-06	1.4e-05	2.6e-05	3.0e-05
Ru-103	4.9e-02	2.1e-02	4.5e-02	8.0e-02	9.2e-02	9.7e-03	4.1e-03	8.9e-03	1.6e-02	1.8e-02
Ru-106	3.9e-02	1.8e-02	3.7e-02	5.9e-02	6.6e-02	7.7e-03	3.7e-03	7.3e-03	1.2e-02	1.3e-02
Ag-108m	3.5e+00	1.2e+00	3.2e+00	5.8e+00	6.6e+00	6.9e-01	2.4e-01	6.4e-01	1.1e+00	1.3e+00
Ag-110m	5.9e+00	2.1e+00	5.5e+00	9.8e+00	1.1e+01	1.2e+00	4.1e-01	1.1e+00	1.9e+00	2.2e+00
Cd-109	1.6e-02	8.5e-03	1.6e-02	2.4e-02	2.7e-02	3.2e-03	1.7e-03	3.1e-03	4.7e-03	5.2e-03
Sn-113	3.3e-02	1.5e-02	3.1e-02	5.2e-02	5.7e-02	6.6e-03	3.1e-03	6.2e-03	1.0e-02	1.1e-02
Sb-124	2.5e+00	8.6e-01	2.3e+00	4.3e+00	5.0e+00	5.0e-01	1.8e-01	4.6e-01	8.5e-01	9.8e-01
Sb-125	6.8e-01	2.4e-01	6.3e-01	1.1e+00	1.3e+00	1.3e-01	4.9e-02	1.3e-01	2.2e-01	2.5e-01
Te-123m	8.1e-01	3.8e-01	8.0e-01	8.3e-01	8.9e-01	1.2e-01	7.9e-02	1.2e-01	1.6e-01	1.7e-01
Te-127m	5.9e-02	3.6e-02	5.8e-02	8.1e-02	8.7e-02	1.2e-02	7.5e-03	1.1e-02	1.6e-02	1.7e-02
I-125	9.7e-03	1.3e-03	7.6e-03	2.1e-02	2.5e-02	1.9e-03	2.6e-04	1.5e-03	4.0e-03	4.9e-03
I-129	1.0e-01	1.4e-02	8.0e-02	2.1e-01	2.6e-01	2.0e-02	2.7e-03	1.6e-02	4.2e-02	5.1e-02
I-131	1.2e-01	6.6e-03	5.7e-02	3.2e-01	4.5e-01	2.4e-02	1.3e-03	1.1e-02	6.4e-02	8.8e-02
Cs-134	2.2e+01	1.4e+01	2.1e+01	2.9e+01	3.1e+01	4.3e+00	2.8e+00	4.2e+00	5.5e+00	5.9e+00
Cs-135	7.7e-03	1.7e-03	7.3e-03	1.4e-02	1.6e-02	1.5e-03	3.5e-04	1.5e-03	2.7e-03	3.0e-03
Cs-137	7.9e+00	5.1e+00	7.8e+00	1.1e+01	1.1e+01	1.6e+00	1.0e+00	1.5e+00	2.0e+00	2.2e+00
Ba-133	1.9e-01	9.9e-02	1.8e-01	2.7e-01	3.0e-01	3.7e-02	2.0e-02	3.5e-02	5.3e-02	5.9e-02
Ce-139	3.3e-02	1.8e-02	3.2e-02	4.9e-02	5.4e-02	6.6e-03	3.6e-03	6.3e-03	9.5e-03	1.1e-02
Ce-141	9.1e-03	4.0e-03	8.2e-03	1.5e-02	1.7e-02	1.8e-03	8.1e-04	1.6e-03	2.9e-03	3.3e-03
Ce-144	3.3e-02	1.8e-02	3.1e-02	4.7e-02	5.2e-02	6.4e-03	3.5e-03	6.2e-03	9.3e-03	1.0e-02
Pm-147	2.0e-04	8.8e-05	1.8e-04	3.2e-04	3.7e-04	3.9e-05	1.8e-05	3.7e-05	6.2e-05	7.2e-05

Table F2.9 Normalized effective doses from all pathways: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.5e-04	6.3e-05	1.3e-04	2.3e-04	2.7e-04	2.9e-05	1.3e-05	2.7e-05	4.5e-05	5.2e-05
Eu-152	8.4e-01	4.5e-01	8.0e-01	1.2e+00	1.4e+00	1.7e-01	9.1e-02	1.6e-01	2.4e-01	2.8e-01
Eu-154	8.3e-01	4.4e-01	7.9e-01	1.2e+00	1.3e+00	1.6e-01	8.9e-02	1.6e-01	2.3e-01	2.6e-01
Eu-155	5.8e-03	3.1e-03	5.6e-03	8.5e-03	9.5e-03	1.1e-03	6.3e-04	1.1e-03	1.7e-03	1.8e-03
Gd-153	6.5e-03	3.5e-03	6.2e-03	9.5e-03	1.1e-02	1.3e-03	6.9e-04	1.2e-03	1.9e-03	2.1e-03
Tb-160	6.1e-01	3.1e-01	5.8e-01	9.0e-01	1.0e+00	1.2e-01	6.3e-02	1.1e-01	1.8e-01	2.0e-01
Dy-159	8.0e-04	4.0e-04	7.6e-04	1.2e-03	1.4e-03	1.6e-04	8.1e-05	1.5e-04	2.4e-04	2.6e-04
Tm-171	7.6e-05	3.5e-05	7.2e-05	1.2e-04	1.3e-04	1.5e-05	7.1e-06	1.4e-05	2.3e-05	2.6e-05
Ta-182	7.8e-01	4.1e-01	7.5e-01	1.2e+00	1.3e+00	1.5e-01	8.3e-02	1.5e-01	2.2e-01	2.5e-01
W-181	2.6e-04	1.2e-04	2.5e-04	4.1e-04	4.5e-04	5.2e-05	2.4e-05	4.9e-05	8.0e-05	8.8e-05
W-185	2.2e-05	6.3e-06	1.9e-05	3.9e-05	4.5e-05	4.3e-06	1.3e-06	3.8e-06	7.6e-06	8.9e-06
Os-185	7.1e+00	4.4e+00	6.9e+00	9.7e+00	1.0e+01	1.4e+00	9.0e-01	1.4e+00	1.9e+00	2.0e+00
Ir-192	9.3e-02	4.2e-02	8.7e-02	1.5e-01	1.6e-01	1.8e-02	8.3e-03	1.7e-02	2.9e-02	3.2e-02
Tl-204	8.7e-03	4.2e-03	8.3e-03	1.3e-02	1.5e-02	1.7e-03	8.5e-04	1.6e-03	2.6e-03	2.8e-03
Pb-210	6.3e+00	2.7e+00	5.9e+00	9.8e+00	1.1e+01	1.2e+00	5.4e-01	1.2e+00	1.9e+00	2.1e+00
Bi-207	2.2e+01	1.4e+01	2.1e+01	2.9e+01	3.0e+01	4.3e+00	2.8e+00	4.2e+00	5.5e+00	5.9e+00
Po-210	2.5e+00	1.2e+00	2.4e+00	3.8e+00	4.2e+00	4.9e-01	2.5e-01	4.6e-01	7.3e-01	8.2e-01
Ra-226	1.5e+00	7.9e-01	1.4e+00	2.1e+00	2.4e+00	2.9e-01	1.6e-01	2.8e-01	4.1e-01	4.6e-01
Ra-228	9.2e-01	4.9e-01	8.7e-01	1.3e+00	1.5e+00	1.8e-01	9.7e-02	1.7e-01	2.6e-01	2.9e-01
Ac-227	3.4e+00	1.5e+00	3.1e+00	5.4e+00	6.3e+00	6.7e-01	3.0e-01	6.2e-01	1.1e+00	1.2e+00
Th-228	2.7e+00	1.3e+00	2.6e+00	4.2e+00	4.8e+00	5.4e-01	2.7e-01	5.1e-01	8.2e-01	9.3e-01
Th-229	8.2e+00	1.4e+00	2.9e+00	5.1e+00	6.0e+00	8.2e-01	2.8e-01	5.7e-01	1.0e+00	1.2e+00
Th-230	3.7e-01	1.6e-01	3.4e-01	6.0e-01	7.1e-01	7.4e-02	3.2e-02	6.7e-02	1.2e-01	1.4e-01
Th-232	6.2e-01	2.7e-01	5.7e-01	1.0e+00	1.2e+00	1.2e-01	5.3e-02	1.1e-01	2.0e-01	2.3e-01
Pa-231	9.9e-01	4.3e-01	9.1e-01	1.6e+00	1.8e+00	2.0e-01	8.6e-02	1.8e-01	3.1e-01	3.5e-01
U-232	1.4e+00	6.0e-01	1.3e+00	2.2e+00	2.6e+00	2.8e-01	1.2e-01	2.5e-01	4.4e-01	5.1e-01
U-233	3.5e-01	1.5e-01	3.2e-01	5.6e-01	6.6e-01	6.8e-02	2.9e-02	6.3e-02	1.1e-01	1.3e-01
U-234	3.4e-01	1.4e-01	3.1e-01	5.5e-01	6.5e-01	6.7e-02	2.9e-02	6.2e-02	1.1e-01	1.3e-01
U-235	3.6e-01	1.6e-01	3.3e-01	5.6e-01	6.6e-01	7.1e-02	3.3e-02	6.6e-02	1.1e-01	1.3e-01
U-236	3.2e-01	1.3e-01	2.9e-01	5.1e-01	6.0e-01	6.2e-02	2.7e-02	5.7e-02	1.0e-01	1.2e-01
U-238	3.0e-01	1.3e-01	2.8e-01	4.9e-01	5.7e-01	6.0e-02	2.7e-02	5.5e-02	9.5e-02	1.1e-01
Np-237	8.7e-01	3.9e-01	8.0e-01	1.4e+00	1.6e+00	1.7e-01	7.8e-02	1.6e-01	2.6e-01	3.1e-01
Pu-236	3.8e-01	1.6e-01	3.4e-01	6.1e-01	7.2e-01	7.4e-02	3.2e-02	6.8e-02	1.2e-01	1.4e-01
Pu-238	5.9e-01	2.5e-01	5.4e-01	9.3e-01	1.1e+00	1.2e-01	5.0e-02	1.1e-01	1.8e-01	2.2e-01
Pu-239	4.6e-01	2.0e-01	4.2e-01	7.2e-01	8.6e-01	9.0e-02	4.0e-02	8.3e-02	1.4e-01	1.7e-01
Pu-240	4.6e-01	2.0e-01	4.2e-01	7.2e-01	8.6e-01	9.0e-02	4.0e-02	8.3e-02	1.4e-01	1.7e-01
Pu-241	5.1e-03	2.2e-03	4.7e-03	8.1e-03	9.7e-03	1.0e-03	4.5e-04	9.3e-04	1.6e-03	1.9e-03
Pu-242	4.2e-01	1.8e-01	3.9e-01	6.7e-01	8.0e-01	8.4e-02	3.7e-02	7.7e-02	1.3e-01	1.6e-01
Pu-244	6.4e-01	3.1e-01	6.0e-01	9.6e-01	1.1e+00	1.3e-01	6.3e-02	1.2e-01	1.9e-01	2.2e-01
Am-241	1.4e+00	5.8e-01	1.3e+00	2.2e+00	2.6e+00	2.7e-01	1.2e-01	2.5e-01	4.4e-01	5.0e-01
Am-242m	1.4e+00	5.9e-01	1.3e+00	2.2e+00	2.6e+00	2.7e-01	1.2e-01	2.5e-01	4.4e-01	5.0e-01
Am-243	1.4e+00	6.2e-01	1.3e+00	2.3e+00	2.6e+00	2.8e-01	1.2e-01	2.6e-01	4.5e-01	5.2e-01
Cm-242	1.6e-01	6.8e-02	1.5e-01	2.6e-01	3.1e-01	3.2e-02	1.4e-02	2.9e-02	5.2e-02	6.0e-02
Cm-243	1.1e+00	4.6e-01	9.7e-01	1.7e+00	2.0e+00	2.1e-01	9.2e-02	1.9e-01	3.3e-01	3.9e-01
Cm-244	8.6e-01	3.7e-01	7.9e-01	1.4e+00	1.6e+00	1.7e-01	7.4e-02	1.6e-01	2.7e-01	3.2e-01
Cm-245	1.4e+00	6.0e-01	1.3e+00	2.3e+00	2.6e+00	2.8e-01	1.2e-01	2.5e-01	4.4e-01	5.1e-01
Cm-246	1.4e+00	5.9e-01	1.3e+00	2.2e+00	2.6e+00	2.7e-01	1.2e-01	2.5e-01	4.3e-01	5.1e-01
Cm-247	1.5e+00	6.6e-01	1.3e+00	2.3e+00	2.7e+00	2.9e-01	1.3e-01	2.7e-01	4.5e-01	5.2e-01
Cm-248	4.9e+00	2.1e+00	4.4e+00	7.9e+00	9.1e+00	9.6e-01	4.2e-01	8.8e-01	1.5e+00	1.8e+00
Bk-249	5.2e-03	2.2e-03	4.8e-03	8.4e-03	9.9e-03	1.0e-03	4.5e-04	9.4e-04	1.6e-03	1.9e-03
Cf-248	2.9e-01	1.2e-01	2.6e-01	4.7e-01	5.5e-01	5.7e-02	2.4e-02	5.2e-02	9.3e-02	1.1e-01
Cf-249	2.5e+00	1.1e+00	2.3e+00	4.0e+00	4.6e+00	4.9e-01	2.2e-01	4.5e-01	7.6e-01	9.1e-01
Cf-250	1.1e+00	4.7e-01	1.0e+00	1.8e+00	2.1e+00	2.2e-01	9.4e-02	2.0e-01	3.6e-01	4.2e-01
Cf-251	2.4e+00	1.0e+00	2.2e+00	3.9e+00	4.5e+00	4.7e-01	2.0e-01	4.3e-01	7.6e-01	8.8e-01
Cf-252	6.5e-01	2.7e-01	5.9e-01	1.1e+00	1.2e+00	1.3e-01	5.5e-02	1.2e-01	2.1e-01	2.4e-01
Cf-254	1.0e+01	5.1e+00	9.5e+00	1.5e+01	1.7e+01	2.0e+00	1.0e+00	1.9e+00	3.0e+00	3.4e+00
Es-254	9.2e-01	4.6e-01	8.9e-01	1.4e+00	1.5e+00	1.8e-01	9.7e-02	1.7e-01	2.7e-01	2.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.10 Normalized effective doses from external exposure: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.6e+01	1.0e+01	1.6e+01	2.2e+01	2.3e+01	3.2e+00	2.1e+00	3.1e+00	4.2e+00	4.5e+00
P-32	2.9e-04	7.2e-05	2.3e-04	5.8e-04	7.1e-04	5.6e-05	1.5e-05	4.4e-05	1.1e-04	1.4e-04
S-35	2.2e-07	1.0e-07	2.1e-07	3.5e-07	3.9e-07	4.4e-08	2.1e-08	4.2e-08	6.8e-08	7.6e-08
Cl-36	1.7e-03	4.7e-04	1.5e-03	2.9e-03	3.4e-03	3.3e-04	9.4e-05	3.0e-04	5.7e-04	6.6e-04
K-40	1.3e+00	8.1e-01	1.3e+00	1.8e+00	1.9e+00	2.6e-01	1.7e-01	2.5e-01	3.4e-01	3.7e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.8e-06	1.5e-06	2.6e-06	4.0e-06	4.4e-06	5.4e-07	3.0e-07	5.2e-07	7.8e-07	8.6e-07
Sc-46	1.2e+00	6.2e-01	1.1e+00	1.6e+00	2.0e+00	2.4e-01	1.3e-01	2.2e-01	3.5e-01	3.9e-01
Cr-51	3.9e-03	1.4e-03	3.4e-03	6.7e-03	7.9e-03	7.6e-04	2.9e-04	6.8e-04	1.3e-03	1.5e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.3e-01	2.6e-01	4.2e-01	5.8e-01	6.2e-01	8.4e-02	5.5e-02	8.3e-02	1.1e-01	1.2e-01
Fe-55	8.1e-12	3.8e-12	7.7e-12	1.2e-11	1.4e-11	1.6e-12	7.6e-13	1.5e-12	2.4e-12	2.7e-12
Fe-59	1.5e-01	6.5e-02	1.4e-01	2.5e-01	2.8e-01	3.0e-02	1.3e-02	2.8e-02	4.8e-02	5.4e-02
Co-58	5.6e-01	2.6e-01	5.3e-01	8.9e-01	9.9e-01	1.1e-01	5.2e-02	1.0e-01	1.7e-01	1.9e-01
Co-57	5.7e-03	2.7e-03	5.3e-03	8.8e-03	9.8e-03	1.1e-03	5.4e-04	1.1e-03	1.7e-03	1.9e-03
Co-58	1.4e-01	6.2e-02	1.3e-01	2.2e-01	2.4e-01	2.7e-02	1.3e-02	2.5e-02	4.2e-02	4.7e-02
Co-60	5.2e-01	2.5e-01	4.9e-01	8.1e-01	8.9e-01	1.0e-01	5.0e-02	9.8e-02	1.6e-01	1.7e-01
Ni-59	2.8e-06	1.3e-06	2.6e-06	4.3e-06	4.7e-06	5.5e-07	2.6e-07	5.2e-07	8.3e-07	9.1e-07
Ni-63	4.7e-10	2.2e-10	4.4e-10	7.2e-10	7.9e-10	9.2e-11	4.5e-11	8.8e-11	1.4e-10	1.5e-10
Zn-65	7.8e+00	4.9e+00	7.7e+00	1.1e+01	1.1e+01	1.5e+00	1.0e+00	1.5e+00	2.0e+00	2.1e+00
As-73	6.5e-04	2.9e-04	6.2e-04	1.0e-03	1.1e-03	1.3e-04	5.9e-05	1.2e-04	2.0e-04	2.2e-04
Se-75	2.6e+00	1.6e+00	2.6e+00	3.5e+00	3.8e+00	5.2e-01	3.4e-01	5.1e-01	6.8e-01	7.3e-01
Sr-85	2.3e-01	1.2e-01	2.2e-01	3.4e-01	3.9e-01	4.5e-02	2.4e-02	4.3e-02	6.7e-02	7.5e-02
Sr-89	8.5e-04	4.3e-04	7.9e-04	1.3e-03	1.5e-03	1.7e-04	8.6e-05	1.6e-04	2.5e-04	2.8e-04
Sr-90	4.0e-03	2.1e-03	3.8e-03	5.7e-03	6.4e-03	7.8e-04	4.4e-04	7.5e-04	1.1e-03	1.2e-03
Y-91	2.9e-03	1.5e-03	2.8e-03	4.4e-03	5.0e-03	5.8e-04	3.0e-04	5.5e-04	8.7e-04	9.7e-04
Zr-93	2.1e-09	1.1e-09	2.0e-09	3.1e-09	3.4e-09	4.2e-10	2.3e-10	4.0e-10	6.0e-10	6.6e-10
Zr-95	5.9e-01	3.1e-01	5.7e-01	8.5e-01	9.5e-01	1.2e-01	6.4e-02	1.1e-01	1.7e-01	1.8e-01
Nb-93m	6.7e-10	3.6e-10	6.4e-10	9.7e-10	1.1e-09	1.3e-10	7.3e-11	1.3e-10	1.9e-10	2.1e-10
Nb-94	1.1e+00	6.2e-01	1.1e+00	1.7e+00	1.9e+00	2.3e-01	1.2e-01	2.2e-01	3.2e-01	3.6e-01
Nb-95	3.0e-01	1.3e-01	2.8e-01	4.9e-01	5.6e-01	6.0e-02	2.7e-02	5.5e-02	9.5e-02	1.1e-01
Mo-93	6.1e-10	2.9e-10	5.8e-10	9.3e-10	1.0e-09	1.2e-10	5.9e-11	1.1e-10	1.8e-10	2.0e-10
Tc-97	1.9e-09	9.1e-10	1.8e-09	2.9e-09	3.3e-09	3.8e-10	1.8e-10	3.6e-10	5.8e-10	6.4e-10
Tc-97m	7.3e-06	3.3e-06	6.9e-06	1.1e-05	1.3e-05	1.4e-06	6.7e-07	1.4e-06	2.3e-06	2.5e-06
Tc-99	2.0e-06	9.4e-07	1.9e-06	3.1e-06	3.4e-06	3.9e-07	1.9e-07	3.7e-07	6.0e-07	6.6e-07
Ru-103	4.9e-02	2.1e-02	4.5e-02	8.0e-02	9.2e-02	9.7e-03	4.1e-03	8.9e-03	1.6e-02	1.8e-02
Ru-106	3.8e-02	1.8e-02	3.6e-02	5.8e-02	6.5e-02	7.5e-03	3.6e-03	7.2e-03	1.1e-02	1.3e-02
Ag-108m	3.5e+00	1.2e+00	3.2e+00	5.6e+00	6.6e+00	6.9e-01	2.4e-01	6.4e-01	1.1e+00	1.3e+00
Ag-110m	5.9e+00	2.1e+00	5.5e+00	9.8e+00	1.1e+01	1.2e+00	4.1e-01	1.1e+00	1.9e+00	2.2e+00
Cd-109	5.7e-03	3.7e-03	5.6e-03	7.7e-03	8.1e-03	1.1e-03	7.6e-04	1.1e-03	1.5e-03	1.6e-03
Sn-113	3.3e-02	1.5e-02	3.1e-02	5.2e-02	5.7e-02	6.5e-03	3.1e-03	6.2e-03	1.0e-02	1.1e-02
Sb-124	2.5e+00	8.6e-01	2.3e+00	4.3e+00	5.0e+00	5.0e-01	1.8e-01	4.6e-01	8.5e-01	9.8e-01
Sb-125	6.8e-01	2.4e-01	6.3e-01	1.1e+00	1.3e+00	1.3e-01	4.9e-02	1.2e-01	2.2e-01	2.5e-01
Te-123m	6.1e-01	3.8e-01	6.0e-01	8.2e-01	8.8e-01	1.2e-01	7.8e-02	1.2e-01	1.6e-01	1.7e-01
Te-127m	4.8e-02	3.0e-02	4.7e-02	6.5e-02	6.9e-02	9.4e-03	6.1e-03	9.3e-03	1.3e-02	1.3e-02
I-125	9.0e-05	2.3e-05	8.2e-05	1.6e-04	1.9e-04	1.8e-05	4.7e-06	1.6e-05	3.1e-05	3.7e-05
I-129	1.9e-04	5.1e-05	1.8e-04	3.3e-04	3.8e-04	3.8e-05	1.0e-05	3.5e-05	6.5e-05	7.5e-05
I-131	1.2e-01	6.5e-03	5.6e-02	3.2e-01	4.4e-01	2.3e-02	1.3e-03	1.1e-02	6.3e-02	8.7e-02
Cs-134	2.2e+01	1.4e+01	2.1e+01	2.9e+01	3.1e+01	4.3e+00	2.8e+00	4.2e+00	5.5e+00	5.9e+00
Cs-135	1.7e-04	1.1e-04	1.7e-04	2.3e-04	2.4e-04	3.4e-05	2.2e-05	3.3e-05	4.4e-05	4.6e-05
Cs-137	7.9e+00	5.0e+00	7.7e+00	1.0e+01	1.1e+01	1.6e+00	1.0e+00	1.5e+00	2.0e+00	2.1e+00
Ba-133	1.9e-01	9.9e-02	1.8e-01	2.7e-01	3.0e-01	3.7e-02	2.0e-02	3.5e-02	5.3e-02	5.9e-02
Ce-139	3.3e-02	1.8e-02	3.2e-02	4.8e-02	5.4e-02	6.5e-03	3.6e-03	6.2e-03	9.5e-03	1.1e-02
Ce-141	8.9e-03	3.9e-03	8.1e-03	1.4e-02	1.7e-02	1.8e-03	7.9e-04	1.6e-03	2.8e-03	3.2e-03
Ce-144	3.0e-02	1.6e-02	2.9e-02	4.4e-02	4.9e-02	6.0e-03	3.3e-03	5.7e-03	8.6e-03	9.6e-03
Pm-147	2.1e-06	1.1e-06	2.0e-06	3.1e-06	3.4e-06	4.2e-07	2.3e-07	4.0e-07	6.0e-07	6.6e-07

Table F2.10 Normalized effective doses from external exposure: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.6e-09	2.4e-09	4.4e-09	6.7e-09	7.4e-09	9.0e-10	5.0e-10	8.7e-10	1.3e-09	1.4e-09
Eu-152	9.4e-01	4.5e-01	8.0e-01	1.2e+00	1.4e+00	1.7e-01	9.0e-02	1.6e-01	2.4e-01	2.6e-01
Eu-154	8.2e-01	4.4e-01	7.9e-01	1.2e+00	1.3e+00	1.6e-01	8.9e-02	1.6e-01	2.3e-01	2.6e-01
Eu-155	5.6e-03	3.0e-03	5.3e-03	8.1e-03	9.0e-03	1.1e-03	6.0e-04	1.1e-03	1.6e-03	1.7e-03
Gd-153	6.4e-03	3.4e-03	6.1e-03	9.4e-03	1.0e-02	1.3e-03	6.8e-04	1.2e-03	1.8e-03	2.0e-03
Tb-160	6.1e-01	3.1e-01	5.8e-01	9.0e-01	1.0e+00	1.2e-01	6.3e-02	1.1e-01	1.8e-01	2.0e-01
Tm-170	4.1e-04	2.2e-04	3.9e-04	5.9e-04	6.5e-04	8.0e-05	4.4e-05	7.7e-05	1.2e-04	1.3e-04
Tm-171	1.5e-05	7.9e-06	1.4e-05	2.1e-05	2.3e-05	2.9e-06	1.6e-06	2.8e-06	4.2e-06	4.5e-06
Ta-182	7.8e-01	4.1e-01	7.5e-01	1.2e+00	1.3e+00	1.5e-01	8.3e-02	1.5e-01	2.2e-01	2.5e-01
W-181	2.6e-04	1.2e-04	2.4e-04	4.0e-04	4.5e-04	5.1e-05	2.4e-05	4.9e-05	7.9e-05	8.7e-05
W-185	8.0e-06	2.3e-06	4.7e-06	7.8e-06	8.8e-06	9.9e-07	4.5e-07	9.4e-07	1.5e-06	1.7e-06
Os-185	7.1e+00	4.4e+00	6.9e+00	9.7e+00	1.0e+01	1.4e+00	9.0e-01	1.4e+00	1.9e+00	2.0e+00
Ir-192	9.3e-02	4.2e-02	8.7e-02	1.5e-01	1.6e-01	1.8e-02	8.3e-03	1.7e-02	2.9e-02	3.2e-02
Tl-204	4.0e-03	2.5e-03	3.9e-03	5.3e-03	5.6e-03	7.8e-04	5.2e-04	7.7e-04	1.0e-03	1.1e-03
Pb-210	9.7e-03	6.2e-03	9.5e-03	1.3e-02	1.4e-02	1.9e-03	1.3e-03	1.9e-03	2.5e-03	2.6e-03
Bi-207	2.2e+01	1.4e+01	2.1e+01	2.9e+01	3.0e+01	4.3e+00	2.8e+00	4.2e+00	5.5e+00	5.9e+00
Po-210	1.2e-04	7.5e-05	1.2e-04	1.6e-04	1.7e-04	2.4e-05	1.6e-05	2.3e-05	3.1e-05	3.3e-05
Ra-226	1.3e+00	7.0e-01	1.2e+00	1.9e+00	2.1e+00	2.6e-01	1.4e-01	2.5e-01	3.7e-01	4.1e-01
Ra-228	6.7e-01	3.6e-01	6.4e-01	9.7e-01	1.1e+00	1.3e-01	7.2e-02	1.3e-01	1.9e-01	2.1e-01
Ac-227	2.0e-01	1.0e-01	1.9e-01	2.9e-01	3.1e-01	3.9e-02	2.1e-02	3.7e-02	5.6e-02	6.1e-02
Th-228	1.1e+00	5.7e-01	1.0e+00	1.5e+00	1.7e+00	2.1e-01	1.1e-01	2.0e-01	3.0e-01	3.3e-01
Th-229	1.4e-01	7.6e-02	1.4e-01	2.1e-01	2.3e-01	2.8e-02	1.5e-02	2.7e-02	4.0e-02	4.5e-02
Th-230	1.0e-04	4.7e-05	9.4e-05	1.5e-04	1.7e-04	2.0e-05	9.5e-06	1.9e-05	3.0e-05	3.4e-05
Th-232	7.1e-03	2.2e-03	6.4e-03	1.2e-02	1.4e-02	1.4e-03	4.3e-04	1.3e-03	2.4e-03	2.8e-03
Pa-231	1.6e-02	8.6e-03	1.6e-02	2.4e-02	2.6e-02	3.2e-03	1.8e-03	3.1e-03	4.6e-03	5.1e-03
U-232	3.5e-02	1.1e-02	3.2e-02	6.1e-02	7.0e-02	6.9e-03	2.3e-03	6.3e-03	1.2e-02	1.4e-02
U-233	6.7e-05	3.6e-05	6.4e-05	9.8e-05	1.1e-04	1.3e-05	7.3e-06	1.3e-05	1.9e-05	2.1e-05
U-234	1.1e-05	6.2e-06	1.1e-05	1.7e-05	1.8e-05	2.2e-06	1.2e-06	2.2e-06	3.2e-06	3.6e-06
U-235	5.2e-02	2.8e-02	5.0e-02	7.6e-02	8.4e-02	1.0e-02	5.7e-03	9.9e-03	1.5e-02	1.6e-02
U-236	4.5e-06	2.4e-06	4.3e-06	6.6e-06	7.3e-06	8.9e-07	4.9e-07	8.5e-07	1.3e-06	1.4e-06
U-238	1.7e-02	9.4e-03	1.7e-02	2.5e-02	2.8e-02	3.5e-03	1.9e-03	3.3e-03	5.0e-03	5.5e-03
Np-237	1.0e-01	5.3e-02	9.6e-02	1.5e-01	1.6e-01	2.0e-02	1.1e-02	1.9e-02	2.8e-02	3.1e-02
Pu-236	2.3e-05	5.7e-06	1.9e-05	4.5e-05	6.3e-05	4.5e-06	1.1e-06	3.8e-06	8.9e-06	1.0e-05
Pu-238	1.7e-06	9.0e-07	1.6e-06	2.5e-06	2.7e-06	3.3e-07	1.8e-07	3.2e-07	4.8e-07	5.3e-07
Pu-239	1.9e-05	1.0e-05	1.9e-05	2.8e-05	3.1e-05	3.8e-06	2.1e-06	3.7e-06	5.5e-06	6.1e-06
Pu-240	1.5e-06	8.2e-07	1.5e-06	2.2e-06	2.5e-06	3.0e-07	1.7e-07	2.9e-07	4.3e-07	4.8e-07
Pu-241	3.2e-07	1.7e-07	3.1e-07	4.8e-07	5.4e-07	6.4e-08	3.4e-08	6.1e-08	9.4e-08	1.0e-07
Pu-242	1.5e-06	7.9e-07	1.4e-06	2.2e-06	2.4e-06	2.9e-07	1.6e-07	2.8e-07	4.2e-07	4.6e-07
Pu-244	2.3e-01	1.2e-01	2.2e-01	3.3e-01	3.7e-01	4.5e-02	2.5e-02	4.3e-02	6.4e-02	7.1e-02
Am-241	6.8e-04	3.6e-04	6.6e-04	9.9e-04	1.1e-03	1.3e-04	7.3e-05	1.3e-04	1.9e-04	2.1e-04
Am-242m	4.2e-03	2.2e-03	4.0e-03	6.1e-03	6.8e-03	8.3e-04	4.5e-04	7.9e-04	1.2e-03	1.3e-03
Am-243	5.7e-02	3.0e-02	5.4e-02	8.2e-02	9.1e-02	1.1e-02	6.1e-03	1.1e-02	1.6e-02	1.8e-02
Cm-242	1.9e-06	1.0e-06	1.9e-06	2.8e-06	3.1e-06	3.8e-07	2.1e-07	3.7e-07	5.5e-07	6.1e-07
Cm-243	4.0e-02	2.1e-02	3.9e-02	5.8e-02	6.5e-02	7.9e-03	4.4e-03	7.6e-03	1.1e-02	1.3e-02
Cm-244	1.9e-06	1.0e-06	1.8e-06	2.7e-06	3.0e-06	3.7e-07	2.0e-07	3.6e-07	5.3e-07	5.9e-07
Cm-245	1.7e-02	9.0e-03	1.6e-02	2.5e-02	2.7e-02	3.3e-03	1.8e-03	3.2e-03	4.8e-03	5.3e-03
Cm-246	1.1e-07	5.8e-08	1.1e-07	1.6e-07	1.8e-07	2.2e-08	1.2e-08	2.1e-08	3.1e-08	3.4e-08
Cm-247	1.9e-01	1.0e-01	1.8e-01	2.7e-01	3.0e-01	3.7e-02	2.0e-02	3.5e-02	5.3e-02	5.8e-02
Cm-248	9.5e-08	5.1e-08	9.1e-08	1.4e-07	1.5e-07	1.9e-08	1.0e-08	1.8e-08	2.7e-08	3.0e-08
Bk-249	3.2e-05	1.0e-05	2.9e-05	5.5e-05	6.4e-05	6.3e-06	2.1e-06	5.6e-06	1.1e-05	1.3e-05
Cf-248	2.3e-06	1.2e-06	2.2e-06	3.3e-06	3.7e-06	4.5e-07	2.5e-07	4.3e-07	6.5e-07	7.1e-07
Cf-249	1.8e-01	9.9e-02	1.8e-01	2.7e-01	3.0e-01	3.6e-02	2.0e-02	3.5e-02	5.2e-02	5.8e-02
Cf-250	6.0e-08	3.2e-08	5.7e-08	8.7e-08	9.7e-08	1.2e-08	6.5e-09	1.1e-08	1.7e-08	1.9e-08
Cf-251	2.9e-02	1.6e-02	2.8e-02	4.3e-02	4.8e-02	5.8e-03	3.2e-03	5.5e-03	8.4e-03	9.3e-03
Cf-252	2.5e-06	1.3e-06	2.4e-06	3.7e-06	4.0e-06	4.9e-07	2.7e-07	4.7e-07	7.1e-07	7.9e-07
Cf-254	9.3e+00	4.7e+00	8.7e+00	1.4e+01	1.6e+01	1.8e+00	9.5e-01	1.7e+00	2.7e+00	3.1e+00
Es-254	6.4e-01	3.4e-01	6.1e-01	9.3e-01	1.0e+00	1.3e-01	6.8e-02	1.2e-01	1.8e-01	2.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.11 Normalized effective doses from inhalation: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	9.9e-04	4.6e-04	9.2e-04	1.5e-03	1.8e-03	1.9e-04	9.3e-05	1.8e-04	3.0e-04	3.5e-04
P-32	8.9e-06	1.9e-06	6.6e-06	1.9e-05	2.3e-05	1.8e-06	3.7e-07	1.3e-06	3.7e-06	4.6e-06
S-35	2.6e-05	9.5e-06	2.3e-05	4.4e-05	5.3e-05	5.2e-06	1.9e-06	4.6e-06	8.6e-06	1.0e-05
Cl-36	1.2e-03	2.9e-04	1.1e-03	2.2e-03	2.7e-03	2.4e-04	5.9e-05	2.1e-04	4.4e-04	5.3e-04
K-40	1.5e-03	7.0e-04	1.4e-03	2.4e-03	2.7e-03	3.0e-04	1.4e-04	2.8e-04	4.6e-04	5.3e-04
Ca-41	9.5e-06	3.9e-06	8.6e-06	1.5e-05	1.8e-05	1.9e-06	8.0e-07	1.7e-06	3.0e-06	3.5e-06
Ca-45	1.0e-04	4.2e-05	9.1e-05	1.6e-04	1.9e-04	2.0e-05	8.4e-06	1.8e-05	3.2e-05	3.7e-05
Sc-46	1.8e-04	7.6e-05	1.7e-04	3.0e-04	3.5e-04	3.6e-05	1.5e-05	3.3e-05	5.9e-05	6.8e-05
Cr-51	4.1e-07	1.2e-07	3.4e-07	7.4e-07	9.2e-07	8.0e-08	2.5e-08	6.7e-08	1.5e-07	1.8e-07
Mn-53	1.3e-06	6.1e-07	1.2e-06	2.0e-06	2.3e-06	2.6e-07	1.2e-07	2.4e-07	4.0e-07	4.6e-07
Mn-54	4.1e-05	1.9e-05	3.8e-05	6.4e-05	7.2e-05	8.0e-06	3.8e-06	7.5e-06	1.2e-05	1.4e-05
Fe-55	4.3e-06	1.6e-06	3.8e-06	7.2e-06	8.4e-06	8.4e-07	3.1e-07	7.5e-07	1.4e-06	1.6e-06
Fe-59	2.6e-05	8.8e-06	2.3e-05	4.5e-05	5.4e-05	5.1e-06	1.8e-06	4.5e-06	8.8e-06	1.1e-05
Co-56	4.9e-05	1.8e-05	4.3e-05	8.3e-05	9.8e-05	9.6e-06	3.6e-06	8.5e-06	1.6e-05	1.9e-05
Co-57	7.2e-06	2.8e-06	6.5e-06	1.2e-05	1.5e-05	1.4e-06	5.5e-07	1.3e-06	2.4e-06	2.8e-06
Co-58	1.6e-05	6.0e-06	1.4e-05	2.8e-05	3.3e-05	3.2e-06	1.2e-06	2.9e-06	5.5e-06	6.4e-06
Co-60	2.2e-04	8.4e-05	2.0e-04	3.7e-04	4.4e-04	4.3e-05	1.7e-05	3.9e-05	7.3e-05	8.6e-05
Ni-59	1.2e-06	4.7e-07	1.1e-06	2.1e-06	2.4e-06	2.5e-07	9.5e-08	2.2e-07	4.1e-07	4.8e-07
Ni-63	4.1e-06	1.6e-06	3.7e-06	6.9e-06	8.0e-06	8.1e-07	3.1e-07	7.3e-07	1.3e-06	1.6e-06
Zn-65	2.4e-03	1.1e-03	2.2e-03	3.7e-03	4.3e-03	4.7e-04	2.3e-04	4.4e-04	7.2e-04	8.3e-04
As-73	1.8e-04	6.3e-05	1.6e-04	3.0e-04	3.6e-04	3.5e-05	1.3e-05	3.1e-05	5.8e-05	6.9e-05
Se-75	1.4e-03	5.4e-04	1.3e-03	2.1e-03	2.4e-03	2.7e-04	1.3e-04	2.5e-04	4.2e-04	4.8e-04
Sr-85	2.0e-05	8.0e-06	1.8e-05	3.3e-05	3.8e-05	3.9e-06	1.6e-06	3.5e-06	6.4e-06	7.5e-06
Sr-89	4.5e-05	1.8e-05	4.0e-05	7.6e-05	8.9e-05	9.0e-06	3.6e-06	8.0e-06	1.5e-05	1.8e-05
Sr-90	1.6e-03	6.5e-04	1.4e-03	2.5e-03	3.0e-03	3.1e-04	1.3e-04	2.8e-04	4.9e-04	5.8e-04
Y-91	2.1e-04	8.4e-05	1.9e-04	3.5e-04	4.1e-04	4.1e-05	1.7e-05	3.7e-05	6.8e-05	8.0e-05
Zr-93	3.3e-04	1.4e-04	3.0e-04	5.4e-04	6.3e-04	6.5e-05	2.8e-05	6.0e-05	1.0e-04	1.2e-04
Zr-95	1.5e-04	6.3e-05	1.4e-04	2.5e-04	2.9e-04	3.0e-05	1.3e-05	2.7e-05	4.8e-05	5.7e-05
Nb-93m	4.2e-05	1.7e-05	3.9e-05	7.0e-05	8.0e-05	8.4e-06	3.5e-06	7.6e-06	1.4e-05	1.6e-05
Nb-94	1.2e-03	5.1e-04	1.1e-03	2.0e-03	2.3e-03	2.4e-04	1.0e-04	2.2e-04	3.9e-04	4.6e-04
Nb-95	3.5e-05	1.2e-05	3.1e-05	6.0e-05	7.2e-05	6.9e-06	2.5e-06	6.1e-06	1.2e-05	1.4e-05
Mo-93	1.6e-05	5.9e-06	1.4e-05	2.7e-05	3.1e-05	3.2e-06	1.2e-06	2.8e-06	5.2e-06	6.2e-06
Tc-97	2.1e-06	8.0e-07	1.9e-06	3.6e-06	4.2e-06	4.2e-07	1.6e-07	3.7e-07	7.0e-07	8.3e-07
Tc-97m	2.8e-05	1.0e-05	2.5e-05	4.8e-05	5.6e-05	5.5e-06	2.1e-06	4.9e-06	9.2e-06	1.1e-05
Tc-99	4.3e-05	1.6e-05	3.8e-05	7.2e-05	8.5e-05	8.4e-06	3.3e-06	7.5e-06	1.4e-05	1.7e-05
Ru-103	1.7e-05	5.7e-06	1.5e-05	2.9e-05	3.5e-05	3.3e-06	1.1e-06	2.9e-06	5.7e-06	6.8e-06
Ru-106	4.4e-04	1.7e-04	3.9e-04	7.3e-04	8.5e-04	8.6e-05	3.3e-05	7.7e-05	1.4e-04	1.7e-04
Ag-108m	1.1e-03	3.4e-04	1.0e-03	2.1e-03	2.4e-03	2.3e-04	6.7e-05	2.0e-04	4.0e-04	4.8e-04
Ag-110m	9.6e-04	2.9e-04	8.4e-04	1.7e-03	2.1e-03	1.9e-04	5.6e-05	1.7e-04	3.4e-04	4.0e-04
Cd-109	4.2e-03	2.0e-03	3.9e-03	6.5e-03	7.5e-03	8.4e-04	4.0e-04	7.8e-04	1.3e-03	1.5e-03
Sn-113	2.1e-05	7.7e-06	1.9e-05	3.6e-05	4.3e-05	4.2e-06	1.6e-06	3.7e-06	7.0e-06	8.3e-06
Sb-124	4.2e-04	1.2e-04	3.6e-04	7.5e-04	9.0e-04	8.2e-05	2.3e-05	7.1e-05	1.5e-04	1.8e-04
Sb-125	4.9e-04	1.5e-04	4.3e-04	8.8e-04	1.1e-03	9.7e-05	2.9e-05	8.6e-05	1.7e-04	2.1e-04
Te-123m	2.7e-03	1.3e-03	2.6e-03	4.3e-03	4.9e-03	5.4e-04	2.6e-04	5.1e-04	8.3e-04	9.5e-04
Te-127m	5.1e-03	2.3e-03	4.7e-03	7.8e-03	9.0e-03	1.0e-03	4.7e-04	9.3e-04	1.5e-03	1.8e-03
I-125	1.2e-03	2.8e-04	1.0e-03	2.3e-03	2.8e-03	2.4e-04	5.6e-05	2.1e-04	4.5e-04	5.5e-04
I-129	1.2e-02	2.9e-03	1.1e-02	2.3e-02	2.8e-02	2.4e-03	5.9e-04	2.1e-03	4.5e-03	5.4e-03
I-131	2.9e-04	1.4e-05	1.3e-04	7.8e-04	1.1e-03	5.7e-05	2.9e-06	2.5e-05	1.5e-04	2.1e-04
Cs-134	9.2e-03	4.4e-03	8.6e-03	1.4e-02	1.6e-02	1.8e-03	8.8e-04	1.7e-03	2.8e-03	3.2e-03
Cs-135	9.8e-04	4.7e-04	9.1e-04	1.5e-03	1.7e-03	1.9e-04	9.4e-05	1.8e-04	2.9e-04	3.4e-04
Cs-137	8.6e-03	3.1e-03	8.2e-03	1.0e-02	1.2e-02	1.3e-03	6.3e-04	1.2e-03	2.0e-03	2.3e-03
Ba-133	8.9e-05	3.7e-05	8.1e-05	1.4e-04	1.7e-04	1.8e-05	7.4e-06	1.6e-05	2.8e-05	3.3e-05
Ce-139	5.9e-05	2.5e-05	5.4e-05	9.7e-05	1.1e-04	1.2e-05	5.0e-06	1.1e-05	1.9e-05	2.2e-05
Ce-141	8.0e-05	2.9e-05	7.0e-05	1.4e-04	1.7e-04	1.6e-05	5.7e-06	1.4e-05	2.7e-05	3.2e-05
Ce-144	1.3e-03	5.6e-04	1.2e-03	2.2e-03	2.5e-03	2.6e-04	1.1e-04	2.4e-04	4.2e-04	5.0e-04
Pm-147	1.6e-04	6.5e-05	1.4e-04	2.5e-04	2.9e-04	3.1e-05	1.3e-05	2.8e-05	4.9e-05	5.8e-05

Table F2.11 Normalized effective doses from inhalation: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.3e-04	5.3e-05	1.2e-04	2.1e-04	2.4e-04	2.5e-05	1.1e-05	2.3e-05	4.1e-05	4.7e-05
Eu-152	1.3e-03	5.6e-04	1.2e-03	2.2e-03	2.6e-03	2.6e-04	1.1e-04	2.4e-04	4.2e-04	5.0e-04
Eu-154	1.7e-03	7.3e-04	1.6e-03	2.8e-03	3.3e-03	3.4e-04	1.5e-04	3.1e-04	5.5e-04	6.5e-04
Eu-155	2.3e-04	9.7e-05	2.1e-04	3.7e-04	4.4e-04	4.6e-05	1.9e-05	4.2e-05	7.3e-05	8.6e-05
Gd-153	6.4e-05	2.7e-05	5.8e-05	1.0e-04	1.2e-04	1.3e-05	5.3e-06	1.1e-05	2.0e-05	2.4e-05
Tb-160	2.0e-04	8.0e-05	1.8e-04	3.2e-04	3.8e-04	3.9e-05	1.6e-05	3.5e-05	6.4e-05	7.4e-05
Tm-170	2.2e-04	8.6e-05	2.0e-04	3.5e-04	4.1e-04	4.3e-05	1.8e-05	3.9e-05	6.9e-05	8.0e-05
Tm-171	4.4e-05	1.8e-05	4.0e-05	7.1e-05	8.2e-05	8.6e-06	3.7e-06	7.9e-06	1.4e-05	1.6e-05
Ta-182	3.0e-04	1.2e-04	2.8e-04	5.0e-04	5.8e-04	6.0e-05	2.5e-05	5.4e-05	9.7e-05	1.1e-04
W-181	4.7e-07	1.7e-07	4.2e-07	7.9e-07	9.5e-07	9.3e-08	3.5e-08	8.3e-08	1.6e-07	1.9e-07
W-185	2.2e-06	7.8e-07	1.9e-06	3.7e-06	4.4e-06	4.3e-07	1.6e-07	3.8e-07	7.2e-07	8.6e-07
Os-185	8.5e-04	3.9e-04	7.9e-04	1.3e-03	1.5e-03	1.7e-04	7.8e-05	1.6e-04	2.6e-04	2.9e-04
Ir-192	4.8e-05	1.7e-05	4.3e-05	8.2e-05	9.7e-05	9.5e-06	3.5e-06	8.6e-06	1.6e-05	1.9e-05
Tl-204	5.9e-04	2.8e-04	5.5e-04	9.1e-04	1.0e-03	1.2e-04	5.7e-05	1.1e-04	1.8e-04	2.1e-04
Pb-210	3.3e+00	1.5e+00	3.0e+00	5.0e+00	5.8e+00	6.4e-01	3.1e-01	6.0e-01	9.8e-01	1.1e+00
Bi-207	3.1e-03	1.5e-03	2.9e-03	4.8e-03	5.5e-03	6.1e-04	3.0e-04	5.7e-04	9.4e-04	1.1e-03
Po-210	1.6e+00	8.5e-01	1.7e+00	2.8e+00	3.2e+00	3.6e-01	1.7e-01	3.4e-01	5.5e-01	6.3e-01
Ra-226	1.1e-01	4.7e-02	1.0e-01	1.8e-01	2.1e-01	2.2e-02	9.3e-03	2.0e-02	3.5e-02	4.1e-02
Ra-228	1.4e-01	5.5e-02	1.2e-01	2.3e-01	2.7e-01	2.7e-02	1.1e-02	2.5e-02	4.5e-02	5.3e-02
Ac-227	3.0e+00	1.2e+00	2.7e+00	4.8e+00	5.7e+00	5.9e-01	2.5e-01	5.4e-01	9.6e-01	1.1e+00
Th-228	1.7e+00	7.0e-01	1.5e+00	2.7e+00	3.2e+00	3.3e-01	1.4e-01	3.0e-01	5.3e-01	6.2e-01
Th-229	3.0e+00	1.2e+00	2.7e+00	4.8e+00	5.7e+00	5.8e-01	2.5e-01	5.3e-01	9.5e-01	1.1e+00
Th-230	3.6e-01	1.5e-01	3.2e-01	5.8e-01	6.9e-01	7.1e-02	3.0e-02	6.4e-02	1.2e-01	1.3e-01
Th-232	6.0e-01	2.5e-01	5.4e-01	9.7e-01	1.1e+00	1.2e-01	5.0e-02	1.1e-01	1.9e-01	2.2e-01
Pa-231	8.5e-01	3.6e-01	7.8e-01	1.4e+00	1.6e+00	1.7e-01	7.2e-02	1.5e-01	2.7e-01	3.1e-01
U-232	1.4e+00	5.7e-01	1.2e+00	2.2e+00	2.6e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	5.0e-01
U-233	3.5e-01	1.5e-01	3.2e-01	5.6e-01	6.6e-01	6.8e-02	2.9e-02	6.2e-02	1.1e-01	1.3e-01
U-234	3.4e-01	1.4e-01	3.1e-01	5.5e-01	6.5e-01	6.7e-02	2.9e-02	6.1e-02	1.1e-01	1.3e-01
U-235	3.1e-01	1.3e-01	2.8e-01	4.9e-01	5.8e-01	6.0e-02	2.6e-02	5.5e-02	9.7e-02	1.1e-01
U-236	3.2e-01	1.3e-01	2.9e-01	5.1e-01	6.0e-01	6.2e-02	2.7e-02	5.7e-02	1.0e-01	1.2e-01
U-238	2.9e-01	1.2e-01	2.6e-01	4.6e-01	5.4e-01	5.6e-02	2.4e-02	5.2e-02	9.1e-02	1.1e-01
Np-237	7.5e-01	3.1e-01	6.8e-01	1.2e+00	1.4e+00	1.5e-01	6.2e-02	1.4e-01	2.8e-01	2.7e-01
Pu-236	3.6e-01	1.5e-01	3.3e-01	5.9e-01	7.0e-01	7.1e-02	3.0e-02	6.5e-02	1.2e-01	1.3e-01
Pu-238	5.5e-01	2.3e-01	5.0e-01	8.9e-01	1.1e+00	1.1e-01	4.6e-02	9.9e-02	1.7e-01	2.0e-01
Pu-239	4.1e-01	1.7e-01	3.8e-01	6.7e-01	7.9e-01	8.2e-02	3.4e-02	7.4e-02	1.3e-01	1.5e-01
Pu-240	4.1e-01	1.7e-01	3.8e-01	6.7e-01	7.9e-01	8.2e-02	3.4e-02	7.4e-02	1.3e-01	1.5e-01
Pu-241	1.4e-03	1.8e-03	4.0e-03	7.1e-03	8.4e-03	8.6e-04	3.6e-04	7.8e-04	1.4e-03	1.6e-03
Pu-242	3.8e-01	1.6e-01	3.5e-01	6.2e-01	7.4e-01	7.6e-02	3.2e-02	6.9e-02	1.2e-01	1.4e-01
Pu-244	3.7e-01	1.5e-01	3.4e-01	6.0e-01	7.1e-01	7.3e-02	3.1e-02	6.6e-02	1.2e-01	1.4e-01
Am-241	1.3e+00	5.6e-01	1.2e+00	2.2e+00	2.5e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	4.9e-01
Am-242m	1.4e+00	5.6e-01	1.2e+00	2.2e+00	2.5e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	4.9e-01
Am-243	1.3e+00	5.6e-01	1.2e+00	2.2e+00	2.5e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	4.9e-01
Cm-242	1.6e-01	6.7e-02	1.5e-01	2.6e-01	3.0e-01	3.2e-02	1.3e-02	2.9e-02	5.1e-02	6.0e-02
Cm-243	9.9e-01	4.2e-01	9.0e-01	1.6e+00	1.9e+00	2.0e-01	8.3e-02	1.8e-01	3.1e-01	3.7e-01
Cm-244	8.4e-01	3.5e-01	7.7e-01	1.4e+00	1.6e+00	1.7e-01	7.1e-02	1.5e-01	2.7e-01	3.1e-01
Cm-245	1.3e+00	5.6e-01	1.2e+00	2.2e+00	2.5e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	5.0e-01
Cm-246	1.3e+00	5.6e-01	1.2e+00	2.2e+00	2.5e+00	2.7e-01	1.1e-01	2.4e-01	4.3e-01	5.0e-01
Cm-247	1.2e+00	5.2e-01	1.1e+00	2.0e+00	2.4e+00	2.5e-01	1.0e-01	2.2e-01	3.9e-01	4.6e-01
Cm-248	4.7e+00	2.0e+00	4.3e+00	7.7e+00	9.0e+00	9.3e-01	4.0e-01	8.5e-01	1.5e+00	1.8e+00
Bk-249	5.0e-03	2.1e-03	4.6e-03	8.1e-03	9.6e-03	9.9e-04	4.2e-04	9.1e-04	1.6e-03	1.9e-03
Cf-248	2.9e-01	1.2e-01	2.6e-01	4.7e-01	5.4e-01	5.7e-02	2.4e-02	5.1e-02	9.2e-02	1.1e-01
Cf-249	2.2e+00	9.2e-01	2.0e+00	3.7e+00	4.2e+00	4.4e-01	1.9e-01	4.0e-01	7.2e-01	8.4e-01
Cf-250	1.1e+00	4.5e-01	9.9e-01	1.8e+00	2.1e+00	2.2e-01	9.1e-02	2.0e-01	3.5e-01	4.1e-01
Cf-251	2.3e+00	9.4e-01	2.1e+00	3.7e+00	4.3e+00	4.5e-01	1.9e-01	4.1e-01	7.3e-01	8.6e-01
Cf-252	6.3e-01	2.6e-01	5.7e-01	1.0e+00	1.2e+00	1.2e-01	5.3e-02	1.1e-01	2.0e-01	2.4e-01
Cf-254	7.6e-01	3.0e-01	6.8e-01	1.3e+00	1.5e+00	1.5e-01	6.0e-02	1.4e-01	2.5e-01	2.9e-01
Es-254	2.8e-01	1.2e-01	2.6e-01	4.5e-01	5.3e-01	5.5e-02	2.3e-02	5.0e-02	8.8e-02	1.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.12 Normalized effective doses from ingestion: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.3e-03	5.1e-04	5.0e-03	9.9e-03	1.1e-02	1.0e-03	1.0e-04	9.9e-04	1.9e-03	2.2e-03
P-32	6.5e-05	4.1e-06	4.3e-05	1.5e-04	2.0e-04	1.3e-05	8.2e-07	8.4e-06	3.0e-05	3.9e-05
S-35	1.1e-05	9.9e-07	6.6e-06	2.2e-05	2.7e-05	2.2e-06	2.0e-07	1.9e-06	4.4e-06	5.2e-06
Cl-36	7.4e-04	5.6e-05	5.9e-04	1.6e-03	1.9e-03	1.5e-04	1.1e-05	1.2e-04	3.1e-04	3.8e-04
K-40	1.0e-02	1.0e-03	9.8e-03	2.0e-02	2.2e-02	2.1e-03	2.0e-04	1.9e-03	3.9e-03	4.3e-03
Ca-41	4.8e-05	4.5e-06	4.4e-05	9.3e-05	1.1e-04	9.5e-06	9.2e-07	8.7e-06	1.8e-05	2.2e-05
Ca-45	1.1e-04	1.0e-05	1.0e-04	2.1e-04	2.5e-04	2.2e-05	2.0e-06	2.0e-05	4.1e-05	4.9e-05
Sc-46	1.9e-04	1.7e-05	1.7e-04	3.8e-04	4.4e-04	3.8e-05	3.5e-06	3.4e-05	7.4e-05	8.6e-05
Cr-51	1.4e-06	1.2e-07	1.1e-06	3.0e-06	3.8e-06	2.8e-07	2.3e-08	2.3e-07	5.9e-07	7.4e-07
Mn-53	3.7e-06	3.6e-07	3.4e-06	6.9e-06	7.9e-06	7.2e-07	7.1e-08	6.8e-07	1.3e-06	1.5e-06
Mn-54	8.0e-05	8.0e-06	7.5e-05	1.5e-04	1.7e-04	1.6e-05	1.6e-06	1.5e-05	3.0e-05	3.4e-05
Fe-55	1.4e-05	1.3e-06	1.2e-05	2.8e-05	3.3e-05	2.8e-06	2.5e-07	2.4e-06	5.5e-06	6.6e-06
Fe-59	4.8e-05	4.0e-06	4.1e-05	9.9e-05	1.2e-04	9.5e-06	8.0e-07	8.1e-06	1.9e-05	2.3e-05
Co-56	7.6e-05	6.9e-06	6.6e-05	1.5e-04	1.8e-04	1.5e-05	1.4e-06	1.3e-05	3.0e-05	3.6e-05
Co-57	7.6e-06	6.8e-07	6.7e-06	1.5e-05	1.8e-05	1.5e-06	1.4e-07	1.3e-06	3.0e-06	3.6e-06
Co-58	2.2e-05	2.0e-06	1.9e-05	4.5e-05	5.4e-05	4.4e-06	4.0e-07	3.8e-06	8.8e-06	1.1e-05
Co-60	1.1e-04	9.6e-06	9.5e-05	2.2e-04	2.6e-04	2.1e-05	1.9e-06	1.9e-05	4.2e-05	5.0e-05
Ni-59	2.8e-06	2.5e-07	2.4e-06	5.5e-06	6.5e-06	5.5e-07	5.1e-08	4.9e-07	1.1e-06	1.3e-06
Ni-63	6.6e-06	5.9e-07	5.8e-06	1.3e-05	1.6e-05	1.3e-06	1.2e-07	1.2e-06	2.6e-06	3.0e-06
Zn-65	1.1e-02	1.1e-03	1.0e-02	2.1e-02	2.4e-02	2.2e-03	2.2e-04	2.1e-03	4.1e-03	4.6e-03
As-73	2.3e-04	2.0e-05	2.0e-04	4.7e-04	5.6e-04	4.6e-05	3.9e-06	4.0e-05	9.2e-05	1.1e-04
Se-75	7.0e-03	6.7e-04	6.6e-03	1.3e-02	1.5e-02	1.4e-03	1.4e-04	1.3e-03	2.6e-03	2.9e-03
Sr-85	6.6e-05	6.0e-06	5.9e-05	1.3e-04	1.5e-04	1.3e-05	1.2e-06	1.2e-05	2.5e-05	3.0e-05
Sr-89	2.8e-04	2.5e-05	2.5e-04	5.5e-04	6.6e-04	5.5e-05	5.0e-06	4.9e-05	1.1e-04	1.3e-04
Sr-90	5.1e-03	4.8e-04	4.6e-03	1.0e-02	1.2e-02	1.0e-03	9.3e-05	9.1e-04	1.9e-03	2.2e-03
Y-91	2.8e-04	2.4e-05	2.4e-04	5.5e-04	6.5e-04	5.4e-05	4.9e-06	4.9e-05	1.1e-04	1.3e-04
Zr-93	4.7e-05	4.5e-06	4.3e-05	9.0e-05	1.1e-04	9.2e-06	8.9e-07	8.4e-06	1.8e-05	2.1e-05
Zr-95	1.4e-04	1.3e-05	1.3e-04	2.7e-04	3.2e-04	2.8e-05	2.6e-06	2.5e-05	5.3e-05	6.2e-05
Nb-93m	2.0e-05	1.9e-06	1.8e-05	3.8e-05	4.5e-05	3.9e-06	3.8e-07	3.5e-06	7.5e-06	8.8e-06
Nb-94	2.8e-04	2.7e-05	2.5e-04	5.4e-04	6.4e-04	5.5e-05	5.4e-06	5.0e-05	1.1e-04	1.2e-04
Nb-95	5.2e-05	4.4e-06	4.4e-05	1.1e-04	1.3e-04	1.0e-05	8.7e-07	8.7e-06	2.1e-05	2.5e-05
Mo-93	1.1e-04	1.0e-05	1.0e-04	2.3e-04	2.7e-04	2.3e-05	2.1e-06	2.0e-05	4.5e-05	5.3e-05
Tc-97	3.7e-06	3.4e-07	3.2e-06	7.4e-06	8.7e-06	7.2e-07	6.8e-08	6.4e-07	1.4e-06	1.7e-06
Tc-97m	2.3e-05	2.1e-06	2.0e-05	4.5e-05	5.4e-05	4.5e-06	4.1e-07	3.9e-06	8.9e-06	1.1e-05
Tc-99	3.5e-05	3.2e-06	3.0e-05	6.9e-05	8.2e-05	6.8e-06	6.4e-07	6.0e-06	1.4e-05	1.6e-05
Ru-103	1.9e-05	1.6e-06	1.6e-05	3.8e-05	4.6e-05	3.7e-06	3.2e-07	3.1e-06	7.5e-06	9.1e-06
Ru-106	2.9e-04	2.7e-05	2.5e-04	5.8e-04	7.0e-04	5.7e-05	5.4e-06	5.1e-05	1.1e-04	1.4e-04
Ag-108m	1.2e-03	9.2e-05	9.8e-04	2.5e-03	3.1e-03	2.4e-04	1.8e-05	1.9e-04	4.9e-04	6.0e-04
Ag-110m	1.3e-03	1.0e-04	1.1e-03	2.8e-03	3.4e-03	2.6e-04	2.0e-05	2.2e-04	5.5e-04	6.6e-04
Cd-109	6.4e-03	6.2e-04	6.1e-03	1.2e-02	1.4e-02	1.3e-03	1.3e-04	1.2e-03	2.4e-03	2.7e-03
Sn-113	2.8e-05	2.5e-06	2.4e-05	5.6e-05	6.8e-05	5.5e-06	5.0e-07	4.7e-06	1.1e-05	1.3e-05
Sb-124	7.4e-04	5.7e-05	6.0e-04	1.6e-03	1.9e-03	1.5e-04	1.1e-05	1.2e-04	3.1e-04	3.7e-04
Sb-125	5.4e-04	4.4e-05	4.4e-04	1.1e-03	1.4e-03	1.1e-04	8.8e-06	8.8e-05	2.2e-04	2.7e-04
Te-123m	3.8e-03	3.6e-04	3.6e-03	7.2e-03	8.1e-03	7.4e-04	7.4e-05	7.1e-04	1.4e-03	1.6e-03
Te-127m	6.5e-03	6.2e-04	6.2e-03	1.2e-02	1.4e-02	1.3e-03	1.3e-04	1.2e-03	2.4e-03	2.7e-03
I-125	8.4e-03	6.0e-04	6.5e-03	1.9e-02	2.3e-02	1.7e-03	1.2e-04	1.3e-03	3.6e-03	4.4e-03
I-129	8.9e-02	6.4e-03	7.0e-02	1.9e-01	2.4e-01	1.7e-02	1.3e-03	1.4e-02	3.8e-02	4.7e-02
I-131	1.9e-03	4.0e-05	7.2e-04	5.2e-03	8.0e-03	3.8e-04	7.8e-06	1.4e-04	1.0e-03	1.6e-03
Cs-134	8.1e-02	5.9e-03	5.8e-02	1.1e-01	1.3e-01	1.2e-02	1.2e-03	1.1e-02	2.2e-02	2.5e-02
Cs-135	8.6e-03	6.5e-04	6.2e-03	1.2e-02	1.4e-02	1.3e-03	1.3e-04	1.2e-03	2.4e-03	2.7e-03
Cs-137	4.3e-02	4.2e-03	4.0e-02	8.0e-02	9.2e-02	8.4e-03	8.3e-04	8.1e-03	1.6e-02	1.8e-02
Ba-133	1.7e-04	1.5e-05	1.5e-04	3.2e-04	3.7e-04	3.3e-05	3.0e-06	3.0e-05	6.2e-05	7.3e-05
Ce-139	3.7e-05	3.4e-06	3.3e-05	7.2e-05	8.4e-05	7.3e-06	6.6e-07	6.6e-06	1.4e-05	1.6e-05
Ce-141	6.1e-05	5.0e-06	5.1e-05	1.2e-04	1.5e-04	1.2e-05	1.0e-06	1.0e-05	2.4e-05	3.0e-05
Ce-144	8.1e-04	7.5e-05	7.3e-04	1.6e-03	1.8e-03	1.6e-04	1.5e-05	1.5e-04	3.1e-04	3.6e-04
Pm-147	4.2e-05	4.0e-06	3.8e-05	8.2e-05	9.7e-05	8.3e-06	7.9e-07	7.6e-06	1.6e-05	1.9e-05

Table F2.12 Normalized effective doses from ingestion: Transferring EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.6e-05	1.5e-06	1.5e-05	3.1e-05	3.6e-05	3.2e-06	3.1e-07	2.9e-06	6.1e-06	7.1e-06
Eu-152	2.3e-04	2.2e-05	2.1e-04	4.5e-04	5.3e-04	4.5e-05	4.4e-06	4.2e-05	8.7e-05	1.0e-04
Eu-154	3.3e-04	3.1e-05	3.0e-04	6.4e-04	7.5e-04	6.5e-05	6.3e-06	5.9e-05	1.2e-04	1.5e-04
Eu-155	5.2e-05	5.0e-06	4.8e-05	1.0e-04	1.2e-04	1.0e-05	1.0e-06	9.4e-06	2.0e-05	2.3e-05
Gd-153	4.1e-05	3.8e-06	3.7e-05	8.1e-05	9.4e-05	8.1e-06	7.4e-07	7.3e-06	1.6e-05	1.8e-05
Tb-160	1.9e-04	1.8e-05	1.7e-04	3.8e-04	4.4e-04	3.8e-05	3.5e-06	3.4e-05	7.4e-05	8.6e-05
Tm-170	1.8e-04	1.7e-05	1.6e-04	3.5e-04	4.1e-04	3.6e-05	3.4e-06	3.2e-05	7.0e-05	8.0e-05
Tm-171	1.8e-05	1.7e-06	1.6e-05	3.5e-05	4.0e-05	3.5e-06	3.3e-07	3.1e-06	6.8e-06	7.8e-06
Ta-182	2.0e-04	1.9e-05	1.8e-04	4.0e-04	4.6e-04	4.0e-05	3.8e-06	3.6e-05	7.8e-05	9.0e-05
W-181	2.8e-06	2.5e-07	2.4e-06	5.6e-06	6.6e-06	5.5e-07	5.0e-08	4.8e-07	1.1e-06	1.3e-06
W-185	1.4e-05	1.3e-06	1.3e-05	2.8e-05	3.4e-05	2.8e-06	2.5e-07	2.5e-06	5.7e-06	6.7e-06
Re-186	1.3e-03	1.3e-04	1.2e-03	2.5e-03	2.8e-03	2.6e-04	2.5e-05	2.4e-04	4.8e-04	5.5e-04
Ir-192	4.6e-05	4.2e-06	3.9e-05	9.2e-05	1.1e-04	9.1e-06	8.4e-07	7.9e-06	1.8e-05	2.2e-05
Tl-204	4.2e-03	4.0e-04	3.9e-03	7.8e-03	8.9e-03	8.2e-04	8.0e-05	7.9e-04	1.5e-03	1.7e-03
Pb-210	3.0e+00	2.9e-01	2.8e+00	5.6e+00	6.4e+00	5.9e-01	5.8e-02	5.6e-01	1.1e+00	1.2e+00
Bi-207	4.2e-03	4.1e-04	4.0e-03	7.9e-03	9.1e-03	8.3e-04	8.2e-05	8.0e-04	1.5e-03	1.8e-03
Po-210	6.6e-01	6.4e-02	6.3e-01	1.3e+00	1.4e+00	1.3e-01	1.3e-02	1.2e-01	2.4e-01	2.8e-01
Ra-226	4.7e-02	4.5e-03	4.2e-02	9.2e-02	1.1e-01	9.3e-03	8.9e-04	8.4e-03	1.8e-02	2.1e-02
Ra-228	1.1e-01	1.1e-02	1.0e-01	2.2e-01	2.5e-01	2.2e-02	2.1e-03	2.0e-02	4.2e-02	5.0e-02
Ac-227	2.0e-01	1.8e-02	1.8e-01	3.8e-01	4.6e-01	3.9e-02	3.7e-03	3.6e-02	7.5e-02	8.9e-02
Th-228	1.7e-02	1.6e-03	1.5e-02	3.3e-02	3.9e-02	3.4e-03	3.2e-04	3.1e-03	6.6e-03	7.6e-03
Th-229	5.3e-02	5.0e-03	4.8e-02	1.0e-01	1.2e-01	1.0e-02	1.0e-03	9.6e-03	2.0e-02	2.3e-02
Th-230	1.4e-02	1.4e-03	1.3e-02	2.8e-02	3.3e-02	2.9e-03	2.7e-04	2.6e-03	5.5e-03	6.4e-03
Th-232	1.7e-02	1.6e-03	1.5e-02	3.2e-02	3.8e-02	3.3e-03	3.1e-04	3.0e-03	6.3e-03	7.3e-03
Pa-231	1.2e-01	1.1e-02	1.1e-01	2.3e-01	2.7e-01	2.3e-02	2.2e-03	2.1e-02	4.6e-02	5.3e-02
U-232	6.7e-03	6.6e-04	6.1e-03	1.3e-02	1.5e-02	1.3e-03	1.3e-04	1.2e-03	2.5e-03	3.0e-03
U-233	1.4e-03	1.3e-04	1.3e-03	2.7e-03	3.2e-03	2.6e-04	2.7e-05	2.5e-04	5.4e-04	6.2e-04
U-234	1.4e-03	1.3e-04	1.3e-03	2.7e-03	3.1e-03	2.7e-04	2.6e-05	2.5e-04	5.2e-04	6.1e-04
U-235	1.4e-03	1.4e-04	1.3e-03	2.8e-03	3.2e-03	2.8e-04	2.7e-05	2.6e-04	5.5e-04	6.3e-04
U-236	1.3e-03	1.2e-04	1.2e-03	2.5e-03	3.0e-03	2.6e-04	2.5e-05	2.4e-04	5.0e-04	5.8e-04
U-238	1.8e-03	1.7e-04	1.7e-03	3.5e-03	4.1e-03	3.6e-04	3.4e-05	3.3e-04	6.9e-04	8.0e-04
Np-237	1.8e-02	1.6e-03	1.7e-02	3.6e-02	4.2e-02	3.6e-03	3.3e-04	3.3e-03	7.0e-03	8.2e-03
Pu-236	1.4e-02	1.4e-03	1.3e-02	2.7e-02	3.2e-02	2.8e-03	2.7e-04	2.5e-03	5.3e-03	6.2e-03
Pu-238	3.8e-02	3.7e-03	3.4e-02	7.5e-02	8.8e-02	7.5e-03	7.4e-04	6.8e-03	1.4e-02	1.7e-02
Pu-239	4.2e-02	4.0e-03	3.7e-02	8.1e-02	9.5e-02	8.2e-03	8.0e-04	7.3e-03	1.6e-02	1.9e-02
Pu-240	4.2e-02	4.0e-03	3.7e-02	8.1e-02	9.5e-02	8.2e-03	8.0e-04	7.3e-03	1.6e-02	1.9e-02
Pu-241	7.8e-04	7.6e-05	7.0e-04	1.5e-03	1.8e-03	1.5e-04	1.5e-05	1.4e-04	3.0e-04	3.5e-04
Pu-242	4.0e-02	3.9e-03	3.6e-02	7.8e-02	9.1e-02	7.9e-03	7.7e-04	7.0e-03	1.5e-02	1.8e-02
Pu-244	4.0e-02	3.9e-03	3.6e-02	7.8e-02	9.2e-02	7.9e-03	7.8e-04	7.1e-03	1.5e-02	1.8e-02
Am-241	3.3e-02	3.1e-03	3.0e-02	6.5e-02	7.6e-02	6.5e-03	6.3e-04	6.0e-03	1.3e-02	1.5e-02
Am-242m	3.3e-02	3.1e-03	3.0e-02	6.5e-02	7.6e-02	6.5e-03	6.3e-04	6.0e-03	1.3e-02	1.5e-02
Am-243	3.3e-02	3.1e-03	3.0e-02	6.5e-02	7.6e-02	6.6e-03	6.3e-04	6.0e-03	1.3e-02	1.5e-02
Cm-242	1.8e-03	1.6e-04	1.6e-03	3.4e-03	4.0e-03	3.4e-04	3.3e-05	3.2e-04	6.6e-04	7.7e-04
Cm-243	2.5e-02	2.3e-03	2.2e-02	4.8e-02	5.6e-02	4.9e-03	4.7e-04	4.4e-03	9.4e-03	1.1e-02
Cm-244	2.0e-02	1.9e-03	1.8e-02	3.9e-02	4.5e-02	3.9e-03	3.8e-04	3.6e-03	7.5e-03	8.8e-03
Cm-245	3.5e-02	3.3e-03	3.1e-02	6.8e-02	7.9e-02	6.8e-03	6.6e-04	6.2e-03	1.3e-02	1.5e-02
Cm-246	3.5e-02	3.3e-03	3.1e-02	6.8e-02	7.9e-02	6.8e-03	6.6e-04	6.2e-03	1.3e-02	1.5e-02
Cm-247	3.1e-02	2.9e-03	2.8e-02	6.1e-02	7.1e-02	6.2e-03	6.0e-04	5.7e-03	1.2e-02	1.4e-02
Cm-248	1.3e-01	1.2e-02	1.2e-01	2.5e-01	2.9e-01	2.5e-02	2.4e-03	2.3e-02	4.8e-02	5.6e-02
Bk-249	1.6e-04	1.5e-05	1.4e-04	3.2e-04	3.7e-04	3.2e-05	3.0e-06	2.9e-05	6.1e-05	7.1e-05
Cf-248	4.4e-03	4.2e-04	4.0e-03	8.6e-03	1.0e-02	8.7e-04	8.3e-05	7.9e-04	1.7e-03	2.0e-03
Cf-249	5.8e-02	5.6e-03	5.2e-02	1.1e-01	1.3e-01	1.1e-02	1.1e-03	1.0e-02	2.2e-02	2.6e-02
Cf-250	2.6e-02	2.6e-03	2.4e-02	5.1e-02	6.0e-02	5.2e-03	5.0e-04	4.7e-03	1.0e-02	1.2e-02
Cf-251	6.0e-02	5.8e-03	5.4e-02	1.2e-01	1.4e-01	1.2e-02	1.1e-03	1.1e-02	2.3e-02	2.7e-02
Cf-252	1.5e-02	1.4e-03	1.3e-02	2.8e-02	3.3e-02	2.9e-03	2.7e-04	2.6e-03	5.5e-03	6.5e-03
Cf-254	4.6e-02	4.3e-03	4.1e-02	9.1e-02	1.1e-01	9.1e-03	8.4e-04	8.1e-03	1.8e-02	2.1e-02
Es-254	4.4e-03	4.2e-04	4.0e-03	8.7e-03	1.0e-02	8.7e-04	8.3e-05	7.9e-04	1.7e-03	1.9e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.13 Normalized effective doses from all pathways: Baghouse maintenance

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e-01	3.9e-02	1.7e-01	5.8e-01	8.8e-01	5.8e-02	7.8e-03	3.4e-02	1.2e-01	1.7e-01
P-32	5.3e-06	3.9e-07	2.5e-06	1.1e-05	1.8e-05	1.0e-06	7.9e-08	4.9e-07	2.2e-06	3.5e-06
S-35	3.9e-08	4.5e-09	2.2e-08	7.9e-08	1.2e-07	7.7e-09	8.9e-10	4.3e-09	1.5e-08	2.4e-08
Cl-36	4.5e-05	3.8e-06	2.3e-05	9.4e-05	1.4e-04	8.8e-06	7.8e-07	4.6e-06	1.8e-05	2.8e-05
K-40	2.2e-02	2.9e-03	1.3e-02	4.3e-02	6.6e-02	4.3e-03	5.8e-04	2.5e-03	8.4e-03	1.3e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.4e-07	3.0e-08	1.4e-07	4.8e-07	7.3e-07	4.7e-08	6.0e-09	2.7e-08	9.5e-08	1.4e-07
Sc-46	2.1e-02	2.6e-03	1.2e-02	4.3e-02	6.6e-02	4.2e-03	5.3e-04	2.4e-03	8.4e-03	1.3e-02
Cr-51	8.8e-05	8.6e-06	4.6e-05	1.8e-04	2.7e-04	1.7e-05	1.7e-06	9.1e-06	3.5e-05	5.5e-05
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.0e-03	1.0e-03	4.6e-03	1.6e-02	2.4e-02	1.6e-03	2.1e-04	9.1e-04	3.1e-03	4.6e-03
Fe-55	3.5e-13	4.1e-14	2.0e-13	7.0e-13	1.1e-12	6.9e-14	8.4e-15	3.9e-14	1.4e-13	2.1e-13
Fe-59	2.7e-03	3.0e-04	1.5e-03	5.4e-03	8.1e-03	5.3e-04	6.0e-05	2.9e-04	1.1e-03	1.6e-03
Co-56	9.6e-03	1.1e-03	5.3e-03	1.9e-02	3.0e-02	1.9e-03	2.2e-04	1.0e-03	3.8e-03	5.8e-03
Co-57	2.5e-04	2.9e-05	1.4e-04	5.0e-04	7.8e-04	4.8e-05	5.8e-06	2.7e-05	9.8e-05	1.5e-04
Co-58	2.6e-03	3.0e-04	1.4e-03	5.2e-03	8.1e-03	5.1e-04	6.0e-05	2.8e-04	1.0e-03	1.6e-03
Co-60	9.0e-03	1.1e-03	5.0e-03	1.8e-02	2.8e-02	1.8e-03	2.1e-04	9.9e-04	3.6e-03	5.5e-03
Ni-59	5.7e-08	6.6e-09	3.2e-08	1.1e-07	1.8e-07	1.1e-08	1.3e-09	6.3e-09	2.2e-08	3.5e-08
Ni-63	7.4e-10	8.6e-11	4.1e-10	1.5e-09	2.3e-09	1.5e-10	1.7e-11	8.1e-11	2.9e-10	4.5e-10
Zn-65	1.4e-01	1.8e-02	8.0e-02	2.7e-01	4.1e-01	2.7e-02	3.7e-03	1.6e-02	5.4e-02	8.2e-02
As-73	2.1e-04	2.4e-05	1.2e-04	4.1e-04	6.4e-04	4.1e-05	4.9e-06	2.3e-05	8.2e-05	1.2e-04
Se-75	8.8e-02	8.9e-03	3.9e-02	1.3e-01	2.0e-01	1.3e-02	1.8e-03	7.8e-03	2.6e-02	4.0e-02
Sr-85	4.7e-03	5.7e-04	2.6e-03	9.5e-03	1.4e-02	9.2e-04	1.2e-04	5.3e-04	1.9e-03	2.9e-03
Sr-89	1.6e-05	2.0e-06	9.1e-06	3.3e-05	5.0e-05	3.2e-06	3.9e-07	1.8e-06	6.5e-06	9.8e-06
Sr-90	8.9e-05	8.6e-06	3.9e-05	1.4e-04	2.1e-04	1.4e-05	1.7e-06	7.7e-06	2.7e-05	4.1e-05
Y-91	5.3e-05	6.4e-06	2.9e-05	1.1e-04	1.6e-04	1.0e-05	1.3e-06	5.8e-06	2.1e-05	3.1e-05
Zr-93	7.8e-09	8.9e-10	4.4e-09	1.6e-08	2.5e-08	1.5e-09	1.8e-10	8.6e-10	3.1e-09	5.0e-09
Zr-95	1.1e-02	1.3e-03	6.5e-03	2.3e-02	3.4e-02	2.2e-03	2.7e-04	1.3e-03	4.4e-03	6.9e-03
Nb-93m	1.2e-06	1.5e-07	7.0e-07	2.4e-06	3.7e-06	2.4e-07	3.0e-08	1.4e-07	4.8e-07	7.2e-07
Nb-94	2.2e-02	2.7e-03	1.2e-02	4.4e-02	6.6e-02	4.2e-03	5.4e-04	2.5e-03	8.5e-03	1.3e-02
Nb-95	5.7e-03	6.5e-04	3.1e-03	1.1e-02	1.8e-02	1.1e-03	1.3e-04	6.3e-04	2.2e-03	3.5e-03
Mo-93	1.8e-06	2.1e-07	9.9e-07	3.5e-06	5.5e-06	3.4e-07	4.1e-08	2.0e-07	6.9e-07	1.1e-06
Tc-97	2.2e-06	2.5e-07	1.2e-06	4.5e-06	7.1e-06	4.3e-07	5.0e-08	2.5e-07	8.8e-07	1.4e-06
Tc-97m	2.2e-06	2.4e-07	1.2e-06	4.4e-06	6.9e-06	4.3e-07	4.9e-08	2.4e-07	8.7e-07	1.3e-06
Tc-99	1.4e-07	1.6e-08	7.7e-08	2.8e-07	4.4e-07	2.7e-08	3.1e-09	1.5e-08	5.4e-08	8.5e-08
Ru-103	1.0e-03	1.1e-04	5.5e-04	2.1e-03	3.1e-03	2.0e-04	2.2e-05	1.1e-04	4.1e-04	6.1e-04
Ru-106	7.4e-04	8.8e-05	4.1e-04	1.5e-03	2.3e-03	1.4e-04	1.7e-05	8.2e-05	2.9e-04	4.6e-04
Ag-108m	6.9e-02	8.8e-03	3.8e-02	1.4e-01	2.2e-01	1.4e-02	1.4e-03	7.5e-03	2.7e-02	4.3e-02
Ag-110m	1.1e-01	1.1e-02	5.9e-02	2.2e-01	3.5e-01	2.1e-02	2.1e-03	1.2e-02	4.3e-02	6.8e-02
Cd-109	1.2e-03	1.6e-04	6.8e-04	2.3e-03	3.5e-03	2.3e-04	3.1e-05	1.3e-04	4.5e-04	6.8e-04
Sn-113	7.3e-04	8.6e-05	4.1e-04	1.5e-03	2.3e-03	1.4e-04	1.7e-05	8.0e-05	2.9e-04	4.5e-04
Sb-124	4.5e-02	4.4e-03	2.4e-02	9.1e-02	1.5e-01	8.8e-03	8.7e-04	4.8e-03	1.8e-02	2.9e-02
Sb-125	1.4e-02	1.4e-03	7.7e-03	2.9e-02	4.7e-02	2.8e-03	2.8e-04	1.5e-03	5.7e-03	9.2e-03
Te-123m	2.1e-02	2.8e-03	1.2e-02	4.1e-02	6.3e-02	4.1e-03	5.5e-04	2.4e-03	8.2e-03	1.2e-02
Te-127m	1.6e-03	2.1e-04	9.1e-04	3.1e-03	4.7e-03	3.1e-04	4.1e-05	1.8e-04	6.1e-04	9.1e-04
I-125	4.0e-04	3.4e-05	2.1e-04	8.5e-04	1.3e-03	7.8e-05	6.8e-06	4.1e-05	1.6e-04	2.6e-04
I-129	4.2e-04	3.6e-05	2.3e-04	8.6e-04	1.4e-03	8.2e-05	7.1e-06	4.4e-05	1.7e-04	2.6e-04
I-131	2.5e-03	5.4e-05	7.1e-04	5.4e-03	9.4e-03	4.8e-04	1.1e-05	1.4e-04	1.1e-03	1.8e-03
Cs-134	4.1e-01	5.5e-02	2.4e-01	8.2e-01	1.2e+00	8.1e-02	1.1e-02	4.8e-02	1.6e-01	2.4e-01
Cs-135	1.2e-05	1.6e-06	7.1e-06	2.4e-05	3.7e-05	2.4e-06	3.3e-07	1.4e-06	4.7e-06	7.2e-06
Cs-137	1.5e-01	2.1e-02	8.9e-02	3.0e-01	4.6e-01	3.0e-02	4.1e-03	1.8e-02	5.9e-02	9.0e-02
Ba-133	4.4e-03	5.5e-04	2.6e-03	8.9e-03	1.4e-02	8.7e-04	1.1e-04	5.0e-04	1.8e-03	2.7e-03
Ce-139	1.2e-03	1.4e-04	6.5e-04	2.4e-03	3.6e-03	2.3e-04	2.8e-05	1.3e-04	4.7e-04	7.1e-04
Ce-141	3.4e-04	3.8e-05	1.9e-04	7.0e-04	1.1e-03	6.7e-05	7.6e-06	3.7e-05	1.4e-04	2.1e-04
Ce-144	8.0e-04	7.2e-05	3.4e-04	1.2e-03	1.9e-03	1.2e-04	1.4e-05	6.7e-05	2.4e-04	3.7e-04
Pm-147	2.0e-07	2.4e-08	1.1e-07	3.9e-07	6.2e-07	3.9e-08	4.8e-09	2.2e-08	7.8e-08	1.2e-07

Table F2.13 Normalized effective doses from all pathways: Baghouse maintenance

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.4e-08	1.7e-09	7.9e-09	2.7e-08	4.2e-08	2.7e-09	3.4e-10	1.6e-09	5.3e-09	8.3e-09
Eu-152	1.6e-02	1.9e-03	8.6e-03	3.2e-02	4.8e-02	3.1e-03	3.8e-04	1.7e-03	6.1e-03	9.3e-03
Eu-154	1.5e-02	1.8e-03	8.6e-03	3.1e-02	4.7e-02	3.0e-03	3.7e-04	1.7e-03	5.9e-03	9.1e-03
Eu-155	4.5e-04	5.4e-05	2.5e-04	9.0e-04	1.4e-03	8.8e-05	1.1e-05	5.0e-05	1.7e-04	2.7e-04
Gd-153	6.5e-04	8.0e-05	3.7e-04	1.3e-03	2.0e-03	1.3e-04	1.6e-05	7.4e-05	2.6e-04	3.9e-04
Tb-160	1.1e-02	1.3e-03	6.3e-03	2.2e-02	3.5e-02	2.2e-03	2.7e-04	1.2e-03	4.5e-03	6.8e-03
Tm-170	2.9e-05	3.7e-06	1.7e-05	5.8e-05	8.9e-05	5.8e-06	7.3e-07	3.3e-06	1.1e-05	1.8e-05
Tm-171	3.9e-06	4.9e-07	2.2e-06	7.8e-06	1.2e-05	7.7e-07	9.8e-08	4.4e-07	1.5e-06	2.4e-06
Ta-182	1.4e-02	1.7e-03	8.0e-03	2.8e-02	4.3e-02	2.8e-03	3.5e-04	1.6e-03	5.6e-03	8.4e-03
W-181	5.9e-05	6.9e-06	3.3e-05	1.2e-04	1.8e-04	1.2e-05	1.4e-06	6.5e-06	2.3e-05	3.6e-05
W-185	2.6e-07	3.0e-08	1.5e-07	5.1e-07	8.1e-07	5.1e-08	6.0e-09	2.9e-08	1.0e-07	1.6e-07
Os-185	1.4e-01	1.9e-02	8.3e-02	2.8e-01	4.3e-01	2.8e-02	3.8e-03	1.6e-02	5.6e-02	8.3e-02
Ir-192	2.0e-03	2.3e-04	1.1e-03	4.1e-03	6.3e-03	4.0e-04	4.7e-05	2.2e-04	8.0e-04	1.2e-03
Tl-204	2.4e-04	3.2e-05	1.4e-04	4.7e-04	7.3e-04	4.8e-05	6.5e-06	2.8e-05	9.3e-05	1.4e-04
Pb-210	4.6e-04	6.2e-05	2.7e-04	9.1e-04	1.4e-03	9.1e-05	1.2e-05	5.3e-05	1.8e-04	2.7e-04
Bi-207	4.1e-01	5.4e-02	2.4e-01	8.0e-01	1.2e+00	8.0e-02	1.1e-02	4.7e-02	1.6e-01	2.4e-01
Po-210	2.3e-06	3.0e-07	1.3e-06	4.4e-06	6.7e-06	4.4e-07	6.0e-08	2.6e-07	8.8e-07	1.3e-06
Ra-226	2.3e-02	2.9e-03	1.3e-02	4.7e-02	7.0e-02	4.6e-03	5.7e-04	2.6e-03	9.2e-03	1.4e-02
Ra-228	1.2e-02	1.5e-03	7.0e-03	2.5e-02	3.7e-02	2.4e-03	3.0e-04	1.4e-03	4.8e-03	7.3e-03
Ac-227	4.7e-03	5.9e-04	2.8e-03	9.5e-03	1.4e-02	9.3e-04	1.2e-04	5.5e-04	1.9e-03	2.8e-03
Th-228	1.8e-02	2.2e-03	1.0e-02	3.5e-02	5.7e-02	3.6e-03	4.4e-04	2.0e-03	7.0e-03	1.1e-02
Th-229	3.5e-03	4.3e-04	2.0e-03	6.8e-03	1.1e-02	6.9e-04	8.5e-05	3.9e-04	1.3e-03	2.2e-03
Th-230	4.5e-06	5.5e-07	2.5e-06	8.9e-06	1.4e-05	8.9e-07	1.1e-07	5.1e-07	1.8e-06	2.8e-06
Th-232	1.3e-04	1.2e-05	7.0e-05	2.7e-04	4.3e-04	2.6e-05	2.4e-06	1.4e-05	5.3e-05	8.2e-05
Pa-231	4.1e-04	4.9e-05	2.3e-04	8.0e-04	1.3e-03	8.0e-05	1.0e-05	4.6e-05	1.6e-04	2.5e-04
U-232	6.0e-04	5.7e-05	3.2e-04	1.2e-03	2.0e-03	1.2e-04	1.1e-05	6.3e-05	2.5e-04	4.0e-04
U-233	2.8e-06	3.5e-07	1.6e-06	5.5e-06	8.9e-06	5.5e-07	7.0e-08	3.2e-07	1.1e-06	1.8e-06
U-234	1.8e-06	2.2e-07	1.0e-06	3.5e-06	5.6e-06	3.5e-07	4.4e-08	2.0e-07	6.8e-07	1.1e-06
U-235	1.8e-03	2.3e-04	1.1e-03	3.6e-03	5.9e-03	3.6e-04	4.6e-05	2.1e-04	7.1e-04	1.2e-03
U-236	1.2e-06	1.5e-07	7.0e-07	2.4e-06	3.9e-06	2.4e-07	3.0e-08	1.4e-07	4.7e-07	7.7e-07
U-238	3.7e-04	4.6e-05	2.1e-04	7.3e-04	1.2e-03	7.3e-05	9.3e-06	4.2e-05	1.4e-04	2.4e-04
Np-237	2.6e-03	3.2e-04	1.5e-03	5.2e-03	8.1e-03	5.1e-04	6.4e-05	2.9e-04	1.0e-03	1.6e-03
Pu-236	1.8e-06	2.2e-07	1.0e-06	3.6e-06	5.8e-06	3.6e-07	4.4e-08	2.0e-07	7.1e-07	1.1e-06
Pu-238	1.3e-06	1.5e-07	7.2e-07	2.5e-06	3.9e-06	2.5e-07	3.0e-08	1.4e-07	4.9e-07	7.7e-07
Pu-239	1.1e-06	1.3e-07	6.4e-07	2.2e-06	3.5e-06	2.2e-07	2.7e-08	1.3e-07	4.4e-07	6.9e-07
Pu-240	1.2e-06	1.4e-07	6.9e-07	2.4e-06	3.8e-06	2.4e-07	2.9e-08	1.4e-07	4.7e-07	7.4e-07
Pu-241	3.5e-08	4.0e-09	2.0e-08	7.2e-08	1.1e-07	6.9e-09	7.9e-10	3.9e-09	1.4e-08	2.2e-08
Pu-242	1.0e-06	1.2e-07	5.8e-07	2.0e-06	3.1e-06	2.0e-07	2.4e-08	1.1e-07	4.0e-07	6.2e-07
Pu-244	4.4e-03	5.3e-04	2.5e-03	8.8e-03	1.4e-02	8.7e-04	1.1e-04	5.0e-04	1.7e-03	2.7e-03
Am-241	1.6e-04	2.0e-05	9.2e-05	3.3e-04	5.1e-04	3.2e-05	4.0e-06	1.8e-05	6.5e-05	9.9e-05
Am-242m	1.6e-04	1.9e-05	9.0e-05	3.2e-04	4.9e-04	3.1e-05	3.8e-06	1.8e-05	6.3e-05	9.6e-05
Am-243	2.1e-03	2.6e-04	1.2e-03	4.2e-03	6.6e-03	4.1e-04	5.1e-05	2.3e-04	8.4e-04	1.3e-03
Cm-242	1.2e-06	1.5e-07	7.0e-07	2.5e-06	3.7e-06	2.4e-07	3.1e-08	1.4e-07	4.9e-07	7.3e-07
Cm-243	1.2e-03	1.5e-04	7.0e-04	2.5e-03	3.7e-03	2.4e-04	3.0e-05	1.4e-04	4.9e-04	7.3e-04
Cm-244	1.2e-06	1.5e-07	6.8e-07	2.4e-06	3.6e-06	2.3e-07	3.0e-08	1.4e-07	4.7e-07	7.1e-07
Cm-245	8.0e-04	1.0e-04	4.6e-04	1.6e-03	2.4e-03	1.6e-04	2.0e-05	9.1e-05	3.2e-04	4.8e-04
Cm-246	9.3e-07	1.2e-07	5.3e-07	1.9e-06	2.8e-06	1.8e-07	2.3e-08	1.1e-07	3.7e-07	5.5e-07
Cm-247	4.2e-03	5.2e-04	2.4e-03	8.4e-03	1.2e-02	8.2e-04	1.0e-04	4.7e-04	1.7e-03	2.5e-03
Cm-248	8.6e-07	1.1e-07	4.9e-07	1.7e-06	2.6e-06	1.7e-07	2.1e-08	9.7e-08	3.4e-07	5.1e-07
Bk-249	7.2e-07	7.0e-08	3.9e-07	1.5e-06	2.3e-06	1.4e-07	1.4e-08	7.7e-08	2.9e-07	4.5e-07
Cf-248	1.3e-06	1.6e-07	7.7e-07	2.7e-06	4.1e-06	2.6e-07	3.2e-08	1.5e-07	5.3e-07	8.1e-07
Cf-249	4.9e-03	4.9e-04	2.3e-03	8.0e-03	1.2e-02	8.0e-04	9.7e-05	4.6e-04	1.6e-03	2.4e-03
Cf-250	1.0e-06	1.3e-07	5.9e-07	2.1e-06	3.2e-06	2.0e-07	2.5e-08	1.2e-07	4.0e-07	6.2e-07
Cf-251	1.1e-03	1.3e-04	6.0e-04	2.1e-03	3.2e-03	2.1e-04	2.5e-05	1.2e-04	4.1e-04	6.3e-04
Cf-252	1.2e-06	1.4e-07	6.6e-07	2.3e-06	3.5e-06	2.3e-07	2.8e-08	1.3e-07	4.5e-07	7.0e-07
Cf-254	1.7e-01	2.0e-02	9.5e-02	3.4e-01	5.1e-01	3.3e-02	3.9e-03	1.9e-02	6.6e-02	1.0e-01
Es-254	1.1e-02	1.4e-03	6.6e-03	2.3e-02	3.5e-02	2.3e-03	2.9e-04	1.3e-03	4.5e-03	6.9e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.14 Normalized effective doses from all pathways: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.5e-06	7.0e-08	3.7e-07	3.0e-06	7.4e-06	2.9e-07	1.4e-08	7.4e-08	5.9e-07	1.5e-06
C-14	4.8e-04	1.0e-05	7.6e-05	9.2e-04	2.5e-03	9.5e-05	2.0e-06	1.5e-05	1.8e-04	5.0e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	2.3e-04	8.3e-06	5.1e-05	4.5e-04	1.0e-03	4.6e-05	1.6e-06	1.0e-05	9.0e-05	2.0e-04
S-35	9.7e-06	3.1e-07	2.4e-06	2.0e-05	4.5e-05	1.9e-06	6.2e-08	4.7e-07	3.9e-06	8.9e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.8e-03	1.1e-04	7.6e-04	9.2e-03	2.4e-02	9.5e-04	2.2e-05	1.5e-04	1.8e-03	4.8e-03
Mn-53	2.4e-05	1.1e-07	8.1e-07	4.8e-05	1.5e-04	4.8e-06	2.1e-08	1.6e-07	9.5e-06	3.0e-05
Mn-54	2.0e-01	7.8e-04	6.4e-03	3.9e-01	1.2e+00	4.0e-02	1.5e-04	1.3e-03	7.7e-02	2.4e-01
Fe-55	3.0e-04	1.0e-05	8.9e-05	5.9e-04	1.5e-03	6.0e-05	2.0e-06	1.4e-05	1.2e-04	3.0e-04
Fe-59	2.5e-01	8.0e-03	5.3e-02	4.9e-01	1.2e+00	4.9e-02	1.6e-03	1.1e-02	1.0e-01	2.4e-01
Co-56	8.7e-01	2.8e-02	1.9e-01	1.8e+00	4.3e+00	1.7e-01	5.6e-03	3.8e-02	3.6e-01	8.4e-01
Co-57	1.7e-02	5.5e-04	3.8e-03	3.5e-02	8.4e-02	3.4e-03	1.1e-04	7.6e-04	7.1e-03	1.6e-02
Co-58	2.5e-01	8.1e-03	5.6e-02	5.1e-01	1.2e+00	5.0e-02	1.6e-03	1.1e-02	1.0e-01	2.4e-01
Co-60	8.1e-01	2.5e-02	1.8e-01	1.7e+00	4.0e+00	1.6e-01	5.0e-03	3.6e-02	3.3e-01	7.8e-01
Ni-59	8.8e-05	3.5e-06	2.1e-05	1.8e-04	4.6e-04	1.7e-05	7.1e-07	4.1e-06	3.6e-05	9.0e-05
Ni-63	2.0e-04	7.8e-06	4.7e-05	4.1e-04	1.1e-03	3.9e-05	1.6e-06	9.3e-06	8.0e-05	2.0e-04
Zn-65	5.1e-03	2.9e-04	2.2e-03	1.2e-02	2.0e-02	1.0e-03	5.6e-05	4.3e-04	2.3e-03	3.9e-03
As-73	2.4e-04	1.2e-05	5.9e-05	5.0e-04	1.2e-03	4.8e-05	2.3e-06	1.2e-05	9.9e-05	2.4e-04
Se-75	8.3e-02	1.3e-04	8.8e-04	1.3e-01	3.9e-01	1.2e-02	2.5e-05	1.8e-04	2.5e-02	7.8e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	2.3e-03	7.3e-05	5.3e-04	4.5e-03	1.1e-02	4.6e-04	1.5e-05	1.1e-04	9.0e-04	2.2e-03
Tc-97	1.1e-04	4.3e-06	2.6e-05	2.2e-04	5.8e-04	2.2e-05	8.6e-07	5.1e-06	4.4e-05	1.1e-04
Tc-97m	9.2e-04	4.0e-05	2.2e-04	1.9e-03	4.7e-03	1.8e-04	7.9e-06	4.3e-05	3.8e-04	9.2e-04
Tc-99	1.4e-03	5.7e-05	3.3e-04	2.9e-03	7.2e-03	2.8e-04	1.1e-05	6.6e-05	5.7e-04	1.4e-03
Ru-103	1.0e-01	3.5e-03	2.3e-02	2.1e-01	5.0e-01	2.1e-02	6.9e-04	4.5e-03	4.2e-02	1.0e-01
Ru-106	9.4e-02	3.5e-03	2.2e-02	2.0e-01	4.8e-01	1.9e-02	7.0e-04	4.3e-03	3.9e-02	9.2e-02
Ag-108m	5.4e-01	1.5e-02	1.1e-01	1.1e+00	2.7e+00	1.1e-01	3.0e-03	2.1e-02	2.2e-01	5.3e-01
Ag-110m	8.2e-01	2.4e-02	1.6e-01	1.6e+00	4.1e+00	1.6e-01	4.6e-03	3.3e-02	3.3e-01	8.1e-01
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	7.5e-02	2.4e-03	1.7e-02	1.5e-01	3.7e-01	1.5e-02	4.8e-04	3.3e-03	3.1e-02	7.2e-02
Sb-124	1.0e-01	3.1e-03	5.1e-02	2.2e-01	3.3e-01	2.0e-02	6.0e-04	1.0e-02	4.3e-02	6.4e-02
Sb-125	3.3e-02	1.0e-03	1.7e-02	7.3e-02	1.1e-01	6.6e-03	2.0e-04	3.4e-03	1.4e-02	2.1e-02
Te-123m	7.8e-03	3.7e-05	2.4e-04	1.5e-02	4.7e-02	1.5e-03	7.2e-06	4.8e-05	3.1e-03	9.3e-03
Te-127m	1.3e-03	8.0e-06	4.3e-05	2.8e-03	8.4e-03	2.6e-04	1.6e-06	8.4e-06	5.5e-04	1.7e-03
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.14 Normalized effective doses from all pathways: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	9.2e-04	3.1e-05	2.1e-04	1.9e-03	4.5e-03	1.8e-04	6.2e-06	4.1e-05	3.8e-04	8.8e-04
W-185	2.9e-04	9.3e-06	6.7e-05	5.7e-04	1.4e-03	5.8e-05	1.9e-06	1.3e-05	1.1e-04	2.8e-04
Os-185	6.2e-03	2.5e-04	1.5e-03	1.3e-02	2.9e-02	1.2e-03	4.9e-05	3.0e-04	2.6e-03	5.7e-03
Ir-192	2.1e-01	6.8e-03	4.7e-02	4.3e-01	1.0e+00	4.2e-02	1.4e-03	9.2e-03	8.6e-02	2.0e-01
Tl-204	5.6e-05	1.9e-06	1.1e-05	1.1e-04	2.8e-04	1.1e-05	3.8e-07	2.2e-06	2.2e-05	5.5e-05
Pb-210	6.7e-02	2.6e-03	1.4e-02	1.3e-01	3.5e-01	1.3e-02	5.1e-04	2.7e-03	2.7e-02	6.9e-02
Bi-207	1.7e-02	6.5e-04	4.1e-03	3.5e-02	8.2e-02	3.4e-03	1.3e-04	8.1e-04	7.0e-03	1.6e-02
Po-210	6.9e-03	0.0e+00	3.6e-03	1.5e-02	2.3e-02	1.4e-03	0.0e+00	7.0e-04	3.0e-03	4.5e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.15 Normalized effective doses from external exposure: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	9.9e-07	2.0e-08	1.5e-07	1.9e-06	5.2e-06	2.0e-07	4.0e-09	3.0e-08	3.8e-07	1.0e-06
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.2e-04	3.5e-06	2.6e-05	2.4e-04	5.5e-04	2.4e-05	7.1e-07	5.1e-06	4.7e-05	1.1e-04
S-35	1.0e-07	3.8e-09	2.4e-08	2.1e-07	4.7e-07	2.0e-08	7.6e-10	4.7e-09	4.1e-08	9.3e-08
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.8e-03	1.1e-04	7.6e-04	9.1e-03	2.4e-02	9.5e-04	2.2e-05	1.5e-04	1.8e-03	4.8e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.0e-01	7.8e-04	6.4e-03	3.9e-01	1.2e+00	4.0e-02	1.5e-04	1.3e-03	7.7e-02	2.4e-01
Fe-55	2.4e-11	7.3e-13	5.3e-12	4.9e-11	1.2e-10	4.7e-12	1.4e-13	1.0e-12	9.8e-12	2.3e-11
Fe-59	2.5e-01	7.9e-03	5.3e-02	4.9e-01	1.2e+00	4.8e-02	1.6e-03	1.0e-02	9.9e-02	2.4e-01
Co-56	8.7e-01	2.8e-02	1.9e-01	1.8e+00	4.3e+00	1.7e-01	5.6e-03	3.8e-02	3.6e-01	8.4e-01
Co-57	1.7e-02	5.2e-04	3.7e-03	3.4e-02	8.2e-02	3.3e-03	1.0e-04	7.4e-04	6.9e-03	1.6e-02
Co-58	2.5e-01	8.0e-03	5.6e-02	5.1e-01	1.2e+00	4.9e-02	1.6e-03	1.1e-02	1.0e-01	2.4e-01
Co-60	8.0e-01	2.5e-02	1.8e-01	1.6e+00	3.9e+00	1.6e-01	4.9e-03	3.5e-02	3.3e-01	7.7e-01
Ni-59	5.6e-06	1.7e-07	1.3e-06	1.1e-05	2.7e-05	1.1e-06	3.4e-08	2.5e-07	2.3e-06	5.3e-06
Ni-63	9.8e-09	3.0e-10	2.2e-09	2.0e-08	4.8e-08	1.9e-09	6.0e-11	4.3e-10	4.0e-09	9.3e-09
Zn-65	5.0e-03	2.7e-04	2.1e-03	1.2e-02	1.9e-02	9.9e-04	5.4e-05	4.2e-04	2.3e-03	3.8e-03
As-73	5.5e-05	1.9e-06	1.2e-05	1.1e-04	2.6e-04	1.1e-05	3.8e-07	2.4e-06	2.2e-05	5.0e-05
Se-75	6.2e-02	1.2e-04	8.7e-04	1.2e-01	3.8e-01	1.2e-02	2.4e-05	1.7e-04	2.4e-02	7.5e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	4.5e-06	1.4e-07	1.0e-06	9.2e-06	2.2e-05	8.9e-07	2.7e-08	2.0e-07	1.8e-06	4.3e-06
Tc-97	5.9e-06	1.8e-07	1.3e-06	1.2e-05	2.9e-05	1.2e-06	3.6e-08	2.6e-07	2.4e-06	5.6e-06
Tc-97m	2.8e-05	8.9e-07	6.2e-06	5.8e-05	1.4e-04	5.5e-06	1.8e-07	1.2e-06	1.1e-05	2.7e-05
Tc-99	1.5e-05	4.7e-07	3.4e-06	3.1e-05	7.4e-05	3.0e-06	9.2e-08	6.7e-07	6.2e-06	1.4e-05
Ru-103	1.0e-01	3.4e-03	2.3e-02	2.1e-01	5.0e-01	2.1e-02	6.8e-04	4.5e-03	4.1e-02	1.0e-01
Ru-106	7.7e-02	2.4e-03	1.7e-02	1.6e-01	3.7e-01	1.5e-02	4.7e-04	3.4e-03	3.2e-02	7.3e-02
Ag-108m	5.4e-01	1.5e-02	1.1e-01	1.1e+00	2.7e+00	1.1e-01	3.0e-03	2.1e-02	2.1e-01	5.3e-01
Ag-110m	8.2e-01	2.3e-02	1.6e-01	1.6e+00	4.1e+00	1.6e-01	4.6e-03	3.2e-02	3.3e-01	8.0e-01
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	7.4e-02	2.3e-03	1.7e-02	1.5e-01	3.6e-01	1.5e-02	4.7e-04	3.3e-03	3.1e-02	7.1e-02
Sb-124	1.0e-01	3.0e-03	5.1e-02	2.2e-01	3.2e-01	2.0e-02	5.9e-04	1.0e-02	4.3e-02	6.4e-02
Sb-125	3.3e-02	9.9e-04	1.7e-02	7.2e-02	1.1e-01	6.5e-03	2.0e-04	3.3e-03	1.4e-02	2.1e-02
Te-123m	7.3e-03	3.2e-05	2.3e-04	1.4e-02	4.4e-02	1.4e-03	6.3e-06	4.5e-05	2.8e-03	8.5e-03
Te-127m	4.7e-04	2.1e-06	1.5e-05	9.1e-04	2.8e-03	9.3e-05	4.1e-07	2.9e-06	1.8e-04	5.5e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.15 Normalized effective doses from external exposure: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	8.7e-04	2.7e-05	1.9e-04	1.8e-03	4.3e-03	1.7e-04	5.4e-06	3.8e-05	3.6e-04	8.3e-04
W-185	3.2e-05	1.0e-06	7.2e-06	6.6e-05	1.6e-04	6.4e-06	2.1e-07	1.4e-06	1.3e-05	3.1e-05
Os-185	6.2e-03	2.5e-04	1.5e-03	1.3e-02	2.9e-02	1.2e-03	4.8e-05	2.9e-04	2.5e-03	5.6e-03
Ir-192	2.1e-01	6.7e-03	4.6e-02	4.3e-01	1.0e+00	4.1e-02	1.3e-03	9.1e-03	8.5e-02	2.0e-01
Tl-204	1.2e-05	3.6e-07	2.4e-06	2.4e-05	6.0e-05	2.4e-06	7.1e-08	4.7e-07	4.8e-06	1.2e-05
Pb-210	2.7e-05	7.8e-07	5.2e-06	5.4e-05	1.3e-04	5.4e-06	1.6e-07	1.0e-06	1.1e-05	2.6e-05
Bi-207	1.7e-02	6.4e-04	4.1e-03	3.5e-02	8.2e-02	3.4e-03	1.3e-04	8.1e-04	6.9e-03	1.6e-02
Po-210	2.8e-08	0.0e+00	1.5e-08	6.2e-08	9.7e-08	5.5e-09	0.0e+00	2.5e-09	1.2e-08	1.9e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.16 Normalized effective doses from inhalation: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	8.1e-07	3.1e-08	1.5e-07	1.3e-06	3.1e-06	1.2e-07	8.1e-09	3.0e-08	2.5e-07	8.1e-07
C-14	1.1e-04	2.9e-06	1.8e-05	2.4e-04	6.4e-04	2.2e-05	5.9e-07	3.6e-06	4.6e-05	1.3e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.0e-05	3.8e-07	2.2e-06	2.0e-05	4.6e-05	2.0e-06	7.6e-08	4.4e-07	3.9e-06	9.0e-06
S-35	1.0e-06	5.2e-08	2.5e-07	2.2e-06	5.0e-06	2.0e-07	1.0e-08	4.9e-08	4.2e-07	9.9e-07
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	3.5e-06	1.1e-07	5.7e-07	7.1e-06	1.9e-05	8.9e-07	2.2e-08	1.1e-07	1.4e-06	3.8e-06
Mn-53	8.4e-06	4.3e-08	2.8e-07	1.8e-05	5.5e-05	1.7e-06	8.6e-09	5.5e-08	3.4e-06	1.1e-05
Mn-54	2.3e-04	1.2e-06	7.5e-06	4.8e-04	1.5e-03	4.5e-05	2.4e-07	1.5e-06	9.4e-05	3.0e-04
Fe-55	7.7e-05	3.1e-06	1.8e-05	1.7e-04	4.1e-04	1.5e-05	6.1e-07	3.5e-06	3.2e-05	8.1e-05
Fe-59	4.8e-04	2.1e-05	1.1e-04	1.0e-03	2.5e-03	9.4e-05	4.2e-06	2.1e-05	2.0e-04	5.0e-04
Co-56	1.0e-03	4.4e-05	2.4e-04	2.2e-03	5.4e-03	2.1e-04	8.9e-06	4.8e-05	4.4e-04	1.1e-03
Co-57	1.9e-04	7.6e-06	4.4e-05	4.0e-04	9.8e-04	3.7e-05	1.5e-06	8.6e-06	7.7e-05	1.9e-04
Co-58	3.2e-04	1.4e-05	7.5e-05	6.9e-04	1.7e-03	6.4e-05	2.8e-06	1.5e-05	1.3e-04	3.4e-04
Co-60	6.2e-03	2.5e-04	1.4e-03	1.3e-02	3.3e-02	1.2e-03	5.0e-05	2.8e-04	2.5e-03	6.4e-03
Ni-59	3.9e-05	1.6e-06	9.0e-06	8.3e-05	2.1e-04	7.7e-06	3.1e-07	1.8e-06	1.6e-05	4.0e-05
Ni-63	9.5e-05	3.8e-06	2.2e-05	2.0e-04	5.0e-04	1.9e-05	7.6e-07	4.4e-06	3.9e-05	9.9e-05
Zn-65	1.7e-05	1.1e-06	7.6e-06	3.8e-05	6.5e-05	3.3e-06	2.2e-07	1.5e-06	7.4e-06	1.3e-05
As-73	9.7e-05	4.6e-06	2.3e-05	2.0e-04	5.1e-04	1.9e-05	9.2e-07	4.6e-06	4.0e-05	1.0e-04
Se-75	1.7e-04	4.7e-07	2.5e-06	3.8e-04	1.1e-03	3.5e-05	9.1e-08	5.0e-07	7.4e-05	2.3e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	4.7e-04	1.9e-05	1.1e-04	1.0e-03	2.5e-03	9.4e-05	3.8e-06	2.2e-05	2.0e-04	4.9e-04
Tc-97	4.5e-05	1.8e-06	1.0e-05	9.7e-05	2.4e-04	8.9e-06	3.6e-07	2.1e-06	1.9e-05	4.7e-05
Tc-97m	5.3e-04	2.2e-05	1.2e-04	1.1e-03	2.7e-03	1.0e-04	4.5e-06	2.4e-05	2.2e-04	5.5e-04
Tc-99	8.4e-04	3.4e-05	1.9e-04	1.8e-03	4.5e-03	1.7e-04	6.7e-06	3.9e-05	3.5e-04	8.8e-04
Ru-103	3.6e-04	1.6e-05	8.3e-05	7.7e-04	1.9e-03	7.2e-05	3.3e-06	1.6e-05	1.5e-04	3.8e-04
Ru-106	1.3e-02	5.1e-04	2.9e-03	2.7e-02	6.6e-02	2.5e-03	1.0e-04	5.8e-04	5.2e-03	1.3e-02
Ag-108m	1.3e-03	4.6e-05	2.6e-04	2.7e-03	6.8e-03	2.5e-04	9.2e-06	5.2e-05	5.2e-04	1.3e-03
Ag-110m	1.1e-03	3.9e-05	2.2e-04	2.2e-03	5.6e-03	2.1e-04	7.8e-06	4.3e-05	4.4e-04	1.1e-03
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	4.5e-04	1.9e-05	1.1e-04	9.7e-04	2.4e-03	8.9e-05	3.8e-06	2.1e-05	1.9e-04	4.7e-04
Sb-124	2.2e-04	8.3e-06	1.2e-04	4.5e-04	8.9e-04	4.3e-05	1.6e-06	2.4e-05	9.0e-05	1.3e-04
Sb-125	2.6e-04	9.9e-06	1.4e-04	5.3e-04	8.1e-04	5.1e-05	2.0e-06	2.9e-05	1.0e-04	1.6e-04
Te-123m	2.2e-04	1.3e-06	7.0e-06	4.6e-04	1.4e-03	4.3e-05	2.6e-07	1.4e-06	9.0e-05	2.8e-04
Te-127m	4.0e-04	2.4e-06	1.3e-05	8.4e-04	2.6e-03	7.9e-05	4.9e-07	2.5e-06	1.7e-04	5.2e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.16 Normalized effective doses from inhalation: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	5.1e-06	2.1e-07	1.2e-06	1.1e-05	2.6e-05	1.0e-06	4.2e-08	2.3e-07	2.1e-06	5.3e-06
W-185	2.3e-05	9.7e-07	5.3e-06	4.9e-05	1.2e-04	4.5e-06	2.0e-07	1.1e-06	9.6e-06	2.4e-05
Os-185	8.9e-06	4.8e-07	2.2e-06	1.9e-05	4.5e-05	1.8e-06	9.6e-08	4.4e-07	3.7e-06	9.0e-06
Ir-192	8.0e-04	3.4e-05	1.9e-04	1.7e-03	4.1e-03	1.6e-04	6.9e-06	3.7e-05	3.3e-04	8.4e-04
Tl-204	4.2e-06	1.6e-07	8.4e-07	8.5e-06	2.2e-05	8.2e-07	3.3e-08	1.6e-07	1.7e-06	4.4e-06
Pb-210	3.8e-02	1.5e-03	7.7e-03	7.7e-02	2.0e-01	7.5e-03	3.0e-04	1.5e-03	1.5e-02	4.0e-02
Bi-207	3.9e-05	2.0e-06	9.6e-06	8.2e-05	2.0e-04	7.6e-06	3.9e-07	1.9e-06	1.6e-05	4.0e-05
Po-210	5.5e-03	0.0e+00	2.8e-03	1.2e-02	1.8e-02	1.1e-03	0.0e+00	5.4e-04	2.3e-03	3.6e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.17 Normalized effective doses from ingestion: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	8.7e-07	1.7e-08	2.1e-07	1.7e-06	4.0e-06	1.7e-07	3.4e-09	4.1e-08	3.4e-07	7.9e-07
C-14	3.6e-04	4.0e-06	5.5e-05	8.5e-04	1.8e-03	7.2e-05	7.8e-07	1.1e-05	1.3e-04	3.6e-04
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	9.8e-05	1.5e-06	2.0e-05	1.8e-04	4.0e-04	1.9e-05	2.9e-07	3.9e-06	3.6e-05	8.0e-05
S-35	8.6e-06	1.7e-07	2.0e-06	1.7e-05	3.9e-05	1.7e-06	3.3e-08	4.0e-07	3.4e-06	7.8e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.2e-05	1.5e-07	1.8e-06	2.0e-05	5.5e-05	2.3e-06	2.9e-08	3.6e-07	4.0e-06	1.1e-05
Mn-53	1.6e-05	3.3e-08	5.1e-07	2.6e-05	8.9e-05	3.1e-06	6.4e-09	1.0e-07	5.0e-06	1.8e-05
Mn-54	3.5e-04	7.2e-07	1.1e-05	5.7e-04	2.0e-03	6.9e-05	1.4e-07	2.2e-06	1.1e-04	3.9e-04
Fe-55	2.2e-04	3.7e-06	4.9e-05	4.2e-04	1.1e-03	4.5e-05	7.2e-07	9.7e-06	8.3e-05	2.2e-04
Fe-59	8.0e-04	1.3e-05	1.7e-04	1.5e-03	3.7e-03	1.6e-04	2.6e-06	3.4e-05	2.9e-04	7.1e-04
Co-56	1.2e-03	2.1e-05	2.7e-04	2.4e-03	5.8e-03	2.5e-04	4.2e-06	5.4e-05	4.6e-04	1.1e-03
Co-57	1.2e-04	2.1e-06	2.7e-05	2.4e-04	5.9e-04	2.4e-05	4.0e-07	5.4e-06	4.6e-05	1.2e-04
Co-58	3.7e-04	6.2e-06	8.1e-05	7.0e-04	1.7e-03	7.3e-05	1.2e-06	1.6e-05	1.4e-04	3.3e-04
Co-60	1.7e-03	2.9e-05	3.8e-04	3.3e-03	8.5e-03	3.4e-04	5.6e-06	7.6e-05	6.5e-04	1.7e-03
Ni-59	4.4e-05	7.3e-07	9.8e-06	8.4e-05	2.2e-04	8.7e-06	1.4e-07	1.9e-06	1.7e-05	4.2e-05
Ni-63	1.0e-04	1.7e-06	2.3e-05	2.0e-04	5.1e-04	2.1e-05	3.4e-07	4.6e-06	3.9e-05	1.0e-04
Zn-65	7.3e-05	2.0e-06	2.9e-05	1.7e-04	2.9e-04	1.4e-05	4.0e-07	5.8e-06	3.4e-05	5.7e-05
As-73	8.9e-05	1.6e-06	2.0e-05	1.7e-04	4.2e-04	1.8e-05	3.1e-07	3.9e-06	3.3e-05	8.2e-05
Se-75	1.0e-03	1.1e-06	1.5e-05	1.7e-03	8.1e-03	2.1e-04	2.2e-07	3.0e-06	3.4e-04	1.2e-03
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.8e-03	3.0e-05	4.0e-04	3.4e-03	8.9e-03	3.6e-04	5.9e-06	8.0e-05	6.8e-04	1.7e-03
Tc-97	5.8e-05	9.7e-07	1.3e-05	1.1e-04	2.8e-04	1.2e-05	1.9e-07	2.5e-06	2.2e-05	5.6e-05
Tc-97m	3.7e-04	6.1e-06	8.1e-05	6.9e-04	1.7e-03	7.2e-05	1.2e-06	1.6e-05	1.4e-04	3.4e-04
Tc-99	5.5e-04	9.1e-06	1.2e-04	1.0e-03	2.7e-03	1.1e-04	1.8e-06	2.4e-05	2.1e-04	5.2e-04
Ru-103	3.1e-04	5.2e-06	6.7e-05	5.8e-04	1.4e-03	6.1e-05	1.0e-06	1.3e-05	1.1e-04	2.7e-04
Ru-106	4.6e-03	7.8e-05	1.0e-03	8.8e-03	2.2e-02	9.2e-04	1.5e-05	2.0e-04	1.7e-03	4.4e-03
Ag-108m	1.6e-03	2.3e-05	3.1e-04	2.9e-03	7.5e-03	3.1e-04	4.6e-06	6.2e-05	5.7e-04	1.5e-03
Ag-110m	1.7e-03	2.6e-05	3.5e-04	3.2e-03	8.4e-03	3.4e-04	5.1e-06	6.9e-05	6.4e-04	1.7e-03
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	4.4e-04	7.5e-06	9.9e-05	8.4e-04	2.1e-03	8.8e-05	1.5e-06	1.9e-05	1.6e-04	4.1e-04
Sb-124	3.0e-04	5.6e-06	1.4e-04	6.8e-04	1.0e-03	6.0e-05	1.1e-06	2.7e-05	1.3e-04	2.0e-04
Sb-125	2.1e-04	4.0e-06	9.6e-05	4.6e-04	7.3e-04	4.2e-05	7.9e-07	1.9e-05	9.4e-05	1.4e-04
Te-123m	2.5e-04	6.0e-07	8.1e-06	4.1e-04	1.4e-03	5.0e-05	1.2e-07	1.6e-06	8.1e-05	2.8e-04
Te-127m	4.3e-04	1.0e-06	1.4e-05	7.1e-04	2.4e-03	8.6e-05	2.0e-07	2.8e-06	1.4e-04	4.9e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.17 Normalized effective doses from ingestion: Handling metal product

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	4.5e-05	7.5e-07	1.0e-05	8.5e-05	2.1e-04	8.9e-06	1.5e-07	2.0e-06	1.7e-05	4.2e-05
W-185	2.4e-04	4.0e-06	5.2e-05	4.5e-04	1.1e-03	4.7e-05	7.9e-07	1.0e-05	8.8e-05	2.2e-04
Os-185	9.9e-06	1.6e-07	2.3e-06	1.9e-05	4.5e-05	2.0e-06	3.3e-08	4.6e-07	3.8e-06	9.0e-06
Ir-192	7.5e-04	1.3e-05	1.6e-04	1.4e-03	3.5e-03	1.5e-04	2.5e-06	3.3e-05	2.8e-04	6.8e-04
Tl-204	4.0e-05	5.9e-07	7.7e-06	7.3e-05	1.9e-04	7.9e-06	1.2e-07	1.5e-06	1.4e-05	3.7e-05
Pb-210	2.9e-02	4.4e-04	5.5e-03	5.3e-02	1.3e-01	5.7e-03	8.6e-05	1.1e-03	1.1e-02	2.7e-02
Bi-207	3.1e-05	6.0e-07	7.4e-06	6.1e-05	1.5e-04	6.2e-06	1.2e-07	1.5e-06	1.2e-05	2.8e-05
Po-210	1.5e-03	0.0e+00	5.9e-04	3.4e-03	5.2e-03	2.9e-04	0.0e+00	1.2e-04	6.7e-04	1.0e-03
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.18 Normalized effective doses from all pathways: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.5e+00	4.6e-01	2.4e+00	7.9e+00	9.9e+00	8.8e-01	9.3e-02	4.7e-01	1.5e+00	1.9e+00
P-32	5.7e-05	3.4e-06	2.9e-05	1.4e-04	2.2e-04	1.1e-05	6.8e-07	5.7e-06	2.8e-05	4.2e-05
S-35	4.6e-06	5.2e-07	3.0e-06	1.1e-05	1.4e-05	9.0e-07	1.0e-07	5.9e-07	2.1e-06	2.7e-06
Cl-36	8.6e-04	8.4e-05	4.1e-04	1.5e-03	2.1e-03	1.3e-04	1.3e-05	8.1e-05	3.0e-04	4.0e-04
K-40	2.8e-01	3.8e-02	1.9e-01	6.5e-01	8.2e-01	5.6e-02	7.5e-03	3.8e-02	1.3e-01	1.6e-01
Ca-41	7.6e-06	8.6e-07	4.4e-06	1.9e-05	2.5e-05	1.5e-06	1.3e-07	8.7e-07	3.6e-06	4.9e-06
Ca-45	2.8e-05	3.2e-06	1.8e-05	6.4e-05	8.6e-05	5.4e-06	6.5e-07	3.5e-06	1.2e-05	1.7e-05
Sc-46	2.4e-01	2.9e-02	1.6e-01	5.5e-01	7.3e-01	4.8e-02	5.9e-03	3.2e-02	1.1e-01	1.4e-01
Cr-51	8.7e-04	8.4e-05	4.0e-04	1.6e-03	2.2e-03	1.3e-04	1.3e-05	7.7e-05	3.2e-04	4.3e-04
Mn-53	8.4e-07	8.7e-08	3.9e-07	1.5e-06	2.0e-06	1.3e-07	1.3e-08	7.7e-08	3.0e-07	4.0e-07
Mn-54	8.8e-02	1.2e-02	6.0e-02	2.0e-01	2.5e-01	1.7e-02	2.3e-03	1.2e-02	3.9e-02	5.0e-02
Fe-55	2.0e-06	1.7e-07	1.1e-06	4.8e-06	6.4e-06	3.9e-07	3.5e-08	2.3e-07	9.3e-07	1.3e-06
Fe-59	2.4e-02	2.7e-03	1.6e-02	5.7e-02	7.5e-02	4.8e-03	5.4e-04	3.1e-03	1.1e-02	1.5e-02
Co-56	9.5e-02	1.1e-02	6.0e-02	2.2e-01	2.9e-01	1.9e-02	2.1e-03	1.2e-02	4.4e-02	5.7e-02
Co-57	1.1e-03	1.3e-04	6.9e-04	2.5e-03	3.3e-03	2.1e-04	2.5e-05	1.4e-04	4.9e-04	6.4e-04
Co-58	2.3e-02	2.5e-03	1.4e-02	5.3e-02	7.1e-02	4.5e-03	5.1e-04	2.8e-03	1.0e-02	1.4e-02
Co-60	9.1e-02	1.1e-02	5.8e-02	2.1e-01	2.8e-01	1.8e-02	2.1e-03	1.2e-02	4.2e-02	5.4e-02
Ni-59	9.1e-07	1.1e-07	6.0e-07	2.1e-06	2.7e-06	1.8e-07	2.2e-08	1.2e-07	4.1e-07	5.4e-07
Ni-63	1.1e-06	1.2e-07	7.1e-07	2.7e-06	3.6e-06	2.2e-07	2.4e-08	1.4e-07	5.2e-07	7.2e-07
Zn-65	1.6e+00	2.2e-01	1.1e+00	3.7e+00	4.7e+00	3.2e-01	4.4e-02	2.2e-01	7.2e-01	9.2e-01
As-73	2.2e-04	2.6e-05	1.5e-04	5.1e-04	6.8e-04	4.4e-05	5.2e-06	2.9e-05	1.0e-04	1.3e-04
Se-75	5.6e-01	7.7e-02	3.9e-01	1.3e+00	1.6e+00	1.1e-01	1.5e-02	7.6e-02	2.5e-01	3.2e-01
Sr-85	4.7e-02	5.5e-03	3.1e-02	1.1e-01	1.4e-01	9.2e-03	1.1e-03	6.1e-03	2.1e-02	2.8e-02
Sr-89	2.2e-04	2.6e-05	1.4e-04	4.9e-04	6.6e-04	4.2e-05	5.1e-06	2.8e-05	9.6e-05	1.3e-04
Sr-90	1.8e-03	2.1e-04	1.2e-03	4.0e-03	5.3e-03	3.4e-04	4.2e-05	2.3e-04	7.8e-04	1.0e-03
Y-91	6.6e-04	8.1e-05	4.3e-04	1.5e-03	1.9e-03	1.3e-04	1.6e-05	8.5e-05	2.9e-04	3.8e-04
Zr-93	4.9e-05	8.1e-06	3.2e-05	1.1e-04	1.5e-04	9.6e-06	1.2e-06	6.4e-06	2.2e-05	2.9e-05
Zr-95	1.2e-01	1.6e-02	8.2e-02	2.8e-01	3.7e-01	2.4e-02	3.1e-03	1.6e-02	5.5e-02	7.1e-02
Nb-93m	8.5e-06	1.1e-06	5.6e-06	1.9e-05	2.5e-05	1.7e-06	2.2e-07	1.1e-06	3.8e-06	5.0e-06
Nb-94	2.5e-01	3.2e-02	1.6e-01	5.7e-01	7.4e-01	4.9e-02	6.4e-03	3.3e-02	1.1e-01	1.4e-01
Nb-95	5.9e-02	8.6e-03	3.7e-02	1.4e-01	1.8e-01	1.2e-02	1.3e-03	7.2e-03	2.7e-02	3.6e-02
Mo-93	1.4e-05	1.1e-06	8.2e-06	3.5e-05	4.7e-05	2.8e-06	2.2e-07	1.6e-06	7.0e-06	9.4e-06
Tc-97	1.0e-06	1.2e-07	6.7e-07	2.4e-06	3.1e-06	2.0e-07	2.5e-08	1.3e-07	4.7e-07	6.2e-07
Tc-97m	8.9e-06	8.2e-07	4.5e-06	1.6e-05	2.1e-05	1.4e-06	1.6e-07	8.9e-07	3.1e-06	4.1e-06
Tc-99	8.6e-06	9.9e-07	5.6e-06	2.1e-05	2.7e-05	1.7e-06	2.0e-07	1.1e-06	4.0e-06	5.3e-06
Ru-103	7.9e-03	8.5e-04	4.9e-03	1.9e-02	2.5e-02	1.6e-03	1.7e-04	9.7e-04	3.7e-03	4.9e-03
Ru-106	6.7e-03	7.9e-04	4.3e-03	1.5e-02	2.0e-02	1.3e-03	1.6e-04	8.6e-04	3.1e-03	4.0e-03
Ag-108m	8.3e-01	6.7e-02	3.9e-01	1.5e+00	2.0e+00	1.2e-01	1.3e-02	7.7e-02	2.9e-01	3.9e-01
Ag-110m	1.0e+00	1.1e-01	6.4e-01	2.4e+00	3.3e+00	2.0e-01	2.2e-02	1.3e-01	4.8e-01	6.5e-01
Cd-109	3.1e-03	4.3e-04	2.1e-03	8.9e-03	8.7e-03	6.0e-04	8.6e-05	4.2e-04	1.3e-03	1.7e-03
Sn-113	5.7e-03	8.8e-04	3.7e-03	1.3e-02	1.7e-02	1.1e-03	1.3e-04	7.3e-04	2.6e-03	3.4e-03
Sb-124	4.3e-01	4.2e-02	2.6e-01	1.0e+00	1.4e+00	8.5e-02	8.4e-03	5.2e-02	2.0e-01	2.8e-01
Sb-125	1.2e-01	1.2e-02	7.7e-02	2.9e-01	4.0e-01	2.4e-02	2.5e-03	1.5e-02	5.7e-02	7.8e-02
Te-123m	1.4e-01	1.9e-02	9.3e-02	3.1e-01	3.9e-01	2.7e-02	3.7e-03	1.8e-02	6.0e-02	7.7e-02
Te-127m	1.2e-02	1.6e-03	8.0e-03	2.7e-02	3.4e-02	2.3e-03	3.2e-04	1.6e-03	5.1e-03	6.7e-03
I-125	1.3e-03	8.6e-05	7.2e-04	3.3e-03	4.7e-03	2.6e-04	1.7e-05	1.4e-04	6.4e-04	9.3e-04
I-129	1.3e-02	7.9e-04	7.2e-03	3.3e-02	4.8e-02	2.6e-03	1.6e-04	1.4e-03	6.5e-03	9.3e-03
I-131	2.0e-02	2.6e-04	5.0e-03	5.0e-02	9.1e-02	3.9e-03	5.2e-05	9.8e-04	1.0e-02	1.8e-02
Cs-134	4.6e+00	6.3e-01	3.1e+00	1.1e+01	1.3e+01	9.1e-01	1.3e-01	6.2e-01	2.0e+00	2.6e+00
Cs-135	1.0e-03	9.7e-05	6.3e-04	2.5e-03	3.4e-03	2.0e-04	2.0e-05	1.2e-04	4.9e-04	6.5e-04
Cs-137	1.7e+00	2.3e-01	1.2e+00	3.9e+00	4.9e+00	3.3e-01	4.6e-02	2.3e-01	7.5e-01	9.5e-01
Ba-133	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.2e-01	8.1e-03	1.0e-03	5.3e-03	1.9e-02	2.4e-02
Ce-139	7.5e-03	9.2e-04	5.0e-03	1.7e-02	2.2e-02	1.5e-03	1.9e-04	9.8e-04	3.3e-03	4.4e-03
Ce-141	1.9e-03	2.0e-04	1.2e-03	4.4e-03	5.9e-03	3.7e-04	4.1e-05	2.4e-04	8.5e-04	1.2e-03
Ce-144	8.9e-03	8.7e-04	4.6e-03	1.6e-02	2.0e-02	1.4e-03	1.7e-04	9.1e-04	3.1e-03	4.0e-03
Pm-147	2.7e-05	3.4e-06	1.7e-05	6.2e-05	7.9e-05	5.2e-06	6.8e-07	3.4e-06	1.2e-05	1.5e-05

Table F2.18 Normalized effective doses from all pathways: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.9e-05	2.4e-06	1.3e-05	4.4e-05	5.7e-05	3.8e-06	4.8e-07	2.5e-06	8.4e-06	1.1e-05
Eu-152	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.7e-03	2.4e-02	8.0e-02	1.0e-01
Eu-154	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.2e-01	3.5e-02	4.6e-03	2.3e-02	7.8e-02	1.0e-01
Eu-155	1.4e-03	1.9e-04	9.7e-04	3.3e-03	4.3e-03	2.8e-04	3.7e-05	1.9e-04	6.4e-04	8.3e-04
Gd-153	1.6e-03	2.1e-04	1.1e-03	3.7e-03	5.0e-03	3.2e-04	4.2e-05	2.2e-04	7.3e-04	9.6e-04
Tb-160	1.2e-01	1.5e-02	8.2e-02	2.9e-01	3.7e-01	2.4e-02	3.0e-03	1.6e-02	5.6e-02	7.3e-02
Tm-170	1.5e-04	2.0e-05	1.0e-04	3.4e-04	4.4e-04	3.0e-05	3.9e-06	2.0e-05	6.7e-05	8.7e-05
Tm-171	1.3e-05	1.7e-06	8.7e-06	2.9e-05	3.8e-05	2.5e-06	3.3e-07	1.7e-06	5.7e-06	7.3e-06
Ta-182	1.6e-01	2.0e-02	1.1e-01	3.8e-01	4.9e-01	3.2e-02	4.0e-03	2.1e-02	7.4e-02	9.6e-02
W-181	6.3e-05	7.5e-06	4.0e-05	1.4e-04	1.9e-04	1.2e-05	1.5e-06	8.0e-06	2.9e-05	3.7e-05
W-185	2.7e-06	2.9e-07	1.7e-06	6.2e-06	8.6e-06	5.3e-07	5.8e-08	3.3e-07	1.2e-06	1.7e-06
Os-185	1.4e+00	2.0e-01	9.9e-01	3.3e+00	4.2e+00	2.9e-01	3.9e-02	1.9e-01	6.4e-01	8.3e-01
Ir-192	1.6e-02	1.8e-03	1.0e-02	3.7e-02	4.9e-02	3.1e-03	3.6e-04	2.0e-03	7.3e-03	9.4e-03
Tl-204	1.6e-03	2.2e-04	1.1e-03	3.6e-03	4.6e-03	3.1e-04	4.3e-05	2.2e-04	7.0e-04	9.0e-04
Pb-210	8.2e-01	1.1e-01	5.4e-01	1.9e+00	2.4e+00	1.6e-01	2.1e-02	1.1e-01	3.6e-01	4.7e-01
Bi-207	4.6e+00	6.2e-01	3.1e+00	1.1e+01	1.3e+01	9.0e-01	1.2e-01	6.2e-01	2.0e+00	2.6e+00
Po-210	3.1e-01	4.2e-02	2.1e-01	7.1e-01	9.3e-01	6.2e-02	8.3e-03	4.1e-02	1.4e-01	1.8e-01
Ra-226	3.0e-01	3.9e-02	2.0e-01	7.0e-01	8.9e-01	6.0e-02	7.7e-03	4.0e-02	1.4e-01	1.7e-01
Ra-228	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.6e-03	2.4e-02	8.0e-02	1.0e-01
Ac-227	4.6e-01	5.8e-02	3.0e-01	1.1e+00	1.4e+00	9.1e-02	1.2e-02	6.0e-02	2.1e-01	2.7e-01
Th-228	4.5e-01	6.1e-02	3.1e-01	1.0e+00	1.3e+00	8.9e-02	1.2e-02	6.0e-02	2.0e-01	2.6e-01
Th-229	4.3e-01	5.4e-02	2.8e-01	9.7e-01	1.3e+00	8.4e-02	1.1e-02	5.5e-02	1.9e-01	2.5e-01
Th-230	4.9e-02	6.1e-03	3.2e-02	1.1e-01	1.5e-01	9.7e-03	1.2e-03	6.3e-03	2.2e-02	2.8e-02
Th-232	8.3e-02	1.0e-02	5.4e-02	1.9e-01	2.4e-01	1.6e-02	2.1e-03	1.1e-02	3.7e-02	4.8e-02
Pa-231	1.3e-01	1.6e-02	8.8e-02	3.0e-01	3.9e-01	2.6e-02	3.2e-03	1.7e-02	5.8e-02	7.6e-02
U-232	1.9e-01	2.3e-02	1.2e-01	4.3e-01	5.6e-01	3.7e-02	4.6e-03	2.5e-02	8.5e-02	1.1e-01
U-233	4.5e-02	5.5e-03	3.0e-02	1.0e-01	1.4e-01	8.9e-03	1.1e-03	5.9e-03	2.0e-02	2.6e-02
U-234	4.5e-02	5.5e-03	2.9e-02	1.0e-01	1.3e-01	8.8e-03	1.1e-03	5.8e-03	2.0e-02	2.6e-02
U-235	5.2e-02	6.6e-03	3.5e-02	1.2e-01	1.5e-01	1.0e-02	1.3e-03	6.8e-03	2.3e-02	3.0e-02
U-236	4.1e-02	5.1e-03	2.7e-02	9.5e-02	1.2e-01	8.1e-03	1.0e-03	5.4e-03	1.9e-02	2.4e-02
U-238	4.1e-02	5.1e-03	2.7e-02	9.4e-02	1.2e-01	8.1e-03	1.0e-03	5.4e-03	1.9e-02	2.4e-02
Np-237	1.2e-01	1.6e-02	8.2e-02	2.8e-01	3.7e-01	2.4e-02	3.1e-03	1.6e-02	5.5e-02	7.3e-02
Pu-236	4.9e-02	6.0e-03	3.2e-02	1.1e-01	1.5e-01	9.7e-03	1.2e-03	6.3e-03	2.2e-02	2.9e-02
Pu-238	7.7e-02	9.5e-03	5.0e-02	1.8e-01	2.3e-01	1.5e-02	1.9e-03	9.9e-03	3.5e-02	4.5e-02
Pu-239	6.0e-02	7.5e-03	3.9e-02	1.4e-01	1.8e-01	1.2e-02	1.5e-03	7.7e-03	2.7e-02	3.5e-02
Pu-240	6.0e-02	7.5e-03	3.9e-02	1.4e-01	1.8e-01	1.2e-02	1.5e-03	7.6e-03	2.7e-02	3.5e-02
Pu-241	6.8e-04	8.5e-05	4.4e-04	1.5e-03	2.0e-03	1.3e-04	1.7e-05	8.5e-05	3.1e-04	3.9e-04
Pu-242	5.6e-02	7.0e-03	3.6e-02	1.3e-01	1.6e-01	1.1e-02	1.4e-03	7.1e-03	2.5e-02	3.2e-02
Pu-244	1.0e-01	1.3e-02	6.9e-02	2.3e-01	3.0e-01	2.0e-02	2.7e-03	1.4e-02	4.6e-02	5.8e-02
Am-241	1.8e-01	2.2e-02	1.2e-01	4.1e-01	5.4e-01	3.5e-02	4.3e-03	2.3e-02	8.0e-02	1.1e-01
Am-242m	1.8e-01	2.2e-02	1.2e-01	4.1e-01	5.4e-01	3.6e-02	4.3e-03	2.3e-02	8.1e-02	1.1e-01
Am-243	1.9e-01	2.4e-02	1.2e-01	4.4e-01	5.8e-01	3.8e-02	4.7e-03	2.5e-02	8.6e-02	1.1e-01
Cm-242	2.1e-02	2.5e-03	1.3e-02	4.8e-02	6.3e-02	4.1e-03	5.0e-04	2.6e-03	9.6e-03	1.2e-02
Cm-243	1.4e-01	1.8e-02	9.2e-02	3.3e-01	4.2e-01	2.8e-02	3.6e-03	1.8e-02	6.6e-02	8.3e-02
Cm-244	1.1e-01	1.4e-02	7.2e-02	2.7e-01	3.4e-01	2.2e-02	2.7e-03	1.4e-02	5.2e-02	6.6e-02
Cm-245	1.8e-01	2.3e-02	1.2e-01	4.3e-01	5.5e-01	3.6e-02	4.5e-03	2.3e-02	8.6e-02	1.1e-01
Cm-246	1.8e-01	2.2e-02	1.2e-01	4.2e-01	5.4e-01	3.6e-02	4.4e-03	2.3e-02	8.4e-02	1.1e-01
Cm-247	2.1e-01	2.7e-02	1.4e-01	4.9e-01	6.2e-01	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.2e-01
Cm-248	6.4e-01	7.8e-02	4.1e-01	1.5e+00	1.9e+00	1.3e-01	1.5e-02	8.1e-02	2.9e-01	3.7e-01
Bk-249	6.9e-04	8.7e-05	4.4e-04	1.6e-03	2.0e-03	1.4e-04	1.7e-05	8.7e-05	3.1e-04	4.0e-04
Cf-248	3.8e-02	4.6e-03	2.5e-02	8.7e-02	1.1e-01	7.4e-03	9.2e-04	4.9e-03	1.7e-02	2.2e-02
Cf-249	3.4e-01	4.3e-02	2.2e-01	7.7e-01	1.0e+00	6.7e-02	8.6e-03	4.4e-02	1.5e-01	2.0e-01
Cf-250	1.5e-01	1.8e-02	9.5e-02	3.3e-01	4.3e-01	2.9e-02	3.6e-03	1.9e-02	6.5e-02	8.5e-02
Cf-251	3.1e-01	3.9e-02	2.1e-01	7.2e-01	9.3e-01	6.2e-02	7.7e-03	4.1e-02	1.4e-01	1.8e-01
Cf-252	8.4e-02	1.0e-02	5.5e-02	1.9e-01	2.5e-01	1.7e-02	2.1e-03	1.1e-02	3.8e-02	4.9e-02
Cf-254	1.9e+00	2.5e-01	1.3e+00	4.5e+00	5.9e+00	3.8e-01	4.9e-02	2.5e-01	8.9e-01	1.1e+00
Es-254	1.7e-01	2.2e-02	1.2e-01	4.0e-01	5.3e-01	3.4e-02	4.5e-03	2.3e-02	7.8e-02	1.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.19 Normalized effective doses from external exposure: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.5e+00	4.6e-01	2.4e+00	7.9e+00	9.9e+00	8.8e-01	9.3e-02	4.6e-01	1.5e+00	1.9e+00
P-32	5.0e-05	3.0e-06	2.5e-05	1.2e-04	1.9e-04	9.8e-06	5.9e-07	4.9e-06	2.4e-05	3.6e-05
S-35	8.7e-09	7.8e-09	4.5e-08	1.5e-07	2.0e-07	1.3e-08	1.5e-09	8.8e-09	3.0e-08	4.0e-08
Cl-38	3.9e-04	3.7e-05	2.4e-04	9.2e-04	1.2e-03	7.7e-05	7.3e-06	4.8e-05	1.8e-04	2.4e-04
K-40	2.8e-01	3.7e-02	1.9e-01	6.5e-01	8.2e-01	5.5e-02	7.5e-03	3.8e-02	1.3e-01	1.6e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	7.4e-07	9.4e-08	4.9e-07	1.7e-06	2.2e-06	1.5e-07	1.9e-08	9.7e-08	3.3e-07	4.3e-07
Sc-46	2.4e-01	2.9e-02	1.6e-01	5.5e-01	7.3e-01	4.8e-02	5.9e-03	3.2e-02	1.1e-01	1.4e-01
Cr-51	6.7e-04	8.4e-05	4.0e-04	1.6e-03	2.2e-03	1.3e-04	1.3e-05	7.7e-05	3.2e-04	4.3e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	8.8e-02	1.2e-02	6.0e-02	2.0e-01	2.5e-01	1.7e-02	2.3e-03	1.2e-02	3.9e-02	5.0e-02
Fe-55	1.6e-12	1.9e-13	1.0e-12	3.6e-12	4.8e-12	3.1e-13	3.7e-14	2.0e-13	6.9e-13	9.3e-13
Fe-59	2.4e-02	2.7e-03	1.6e-02	5.7e-02	7.5e-02	4.8e-03	5.4e-04	3.1e-03	1.1e-02	1.5e-02
Co-58	9.5e-02	1.1e-02	6.0e-02	2.2e-01	2.9e-01	1.9e-02	2.1e-03	1.2e-02	4.4e-02	5.7e-02
Co-57	1.1e-03	1.3e-04	6.9e-04	2.5e-03	3.3e-03	2.1e-04	2.5e-05	1.4e-04	4.9e-04	6.4e-04
Co-58	2.3e-02	2.5e-03	1.4e-02	5.3e-02	7.1e-02	4.5e-03	5.1e-04	2.8e-03	1.0e-02	1.4e-02
Co-60	9.1e-02	1.1e-02	5.8e-02	2.1e-01	2.8e-01	1.8e-02	2.1e-03	1.2e-02	4.2e-02	5.4e-02
Ni-59	4.9e-07	5.6e-08	3.2e-07	1.1e-06	1.5e-06	9.6e-08	1.2e-08	6.4e-08	2.2e-07	2.9e-07
Ni-63	3.8e-10	4.5e-11	2.5e-10	8.8e-10	1.1e-09	7.5e-11	9.0e-12	5.0e-11	1.7e-10	2.2e-10
Zn-65	1.6e+00	2.2e-01	1.1e+00	3.7e+00	4.7e+00	3.2e-01	4.4e-02	2.2e-01	7.2e-01	9.1e-01
As-73	1.8e-04	2.1e-05	1.2e-04	4.1e-04	5.5e-04	3.5e-05	4.1e-06	2.3e-05	8.2e-05	1.1e-04
Se-75	5.6e-01	7.7e-02	3.9e-01	1.3e+00	1.6e+00	1.1e-01	1.5e-02	7.5e-02	2.5e-01	3.2e-01
Sr-85	4.7e-02	5.5e-03	3.1e-02	1.1e-01	1.4e-01	9.2e-03	1.1e-03	6.0e-03	2.1e-02	2.8e-02
Sr-89	1.8e-04	2.0e-05	1.1e-04	4.0e-04	5.4e-04	3.5e-05	4.1e-06	2.2e-05	7.9e-05	1.0e-04
Sr-90	8.8e-04	1.1e-04	5.9e-04	2.0e-03	2.6e-03	1.7e-04	2.2e-05	1.2e-04	3.9e-04	5.2e-04
Y-91	6.0e-04	7.3e-05	3.9e-04	1.4e-03	1.8e-03	1.2e-04	1.4e-05	7.7e-05	2.7e-04	3.5e-04
Zr-93	3.2e-09	4.0e-10	2.1e-09	7.3e-09	9.5e-09	6.3e-10	7.9e-11	4.2e-10	1.4e-09	1.9e-09
Zr-95	1.2e-01	1.6e-02	8.2e-02	2.8e-01	3.7e-01	2.4e-02	3.1e-03	1.6e-02	5.5e-02	7.1e-02
Nb-93m	2.6e-07	3.3e-08	1.7e-07	5.9e-07	7.7e-07	5.0e-08	6.7e-09	3.4e-08	1.2e-07	1.5e-07
Nb-94	2.5e-01	3.2e-02	1.6e-01	5.6e-01	7.4e-01	4.9e-02	6.4e-03	3.3e-02	1.1e-01	1.4e-01
Nb-95	5.9e-02	6.6e-03	3.7e-02	1.4e-01	1.8e-01	1.2e-02	1.3e-03	7.2e-03	2.7e-02	3.6e-02
Mo-93	3.0e-07	3.6e-08	2.0e-07	7.0e-07	9.1e-07	5.9e-08	7.2e-09	3.9e-08	1.4e-07	1.8e-07
Tc-97	4.1e-07	4.8e-08	2.7e-07	9.3e-07	1.2e-06	8.0e-08	9.6e-09	5.3e-08	1.8e-07	2.4e-07
Tc-97m	1.8e-06	2.0e-07	1.1e-06	4.1e-06	5.3e-06	3.4e-07	4.1e-08	2.2e-07	7.9e-07	1.0e-06
Tc-99	4.3e-07	5.0e-08	2.8e-07	9.8e-07	1.3e-06	8.4e-08	1.0e-08	5.5e-08	1.9e-07	2.5e-07
Ru-103	7.9e-03	8.5e-04	4.9e-03	1.9e-02	2.5e-02	1.6e-03	1.7e-04	9.7e-04	3.7e-03	4.9e-03
Ru-106	6.6e-03	7.8e-04	4.3e-03	1.5e-02	2.0e-02	1.3e-03	1.6e-04	8.5e-04	3.0e-03	4.0e-03
Ag-108m	6.3e-01	6.7e-02	3.9e-01	1.5e+00	2.0e+00	1.2e-01	1.3e-02	7.6e-02	2.9e-01	3.9e-01
Ag-110m	1.0e+00	1.1e-01	6.4e-01	2.4e+00	3.3e+00	2.0e-01	2.2e-02	1.3e-01	4.8e-01	6.5e-01
Cd-109	1.7e-03	2.3e-04	1.1e-03	3.8e-03	4.8e-03	3.3e-04	4.5e-05	2.2e-04	7.4e-04	9.4e-04
Sn-113	5.7e-03	6.8e-04	3.7e-03	1.3e-02	1.7e-02	1.1e-03	1.3e-04	7.3e-04	2.6e-03	3.4e-03
Sb-124	4.3e-01	4.2e-02	2.6e-01	1.0e+00	1.4e+00	8.5e-02	8.4e-03	5.2e-02	2.0e-01	2.8e-01
Sb-125	1.2e-01	1.2e-02	7.7e-02	2.9e-01	4.0e-01	2.4e-02	2.5e-03	1.5e-02	5.7e-02	7.8e-02
Te-123m	1.3e-01	1.8e-02	9.2e-02	3.1e-01	3.9e-01	2.6e-02	3.6e-03	1.8e-02	6.0e-02	7.7e-02
Te-127m	1.0e-02	1.4e-03	7.0e-03	2.3e-02	3.0e-02	2.0e-03	2.8e-04	1.4e-03	4.5e-03	5.8e-03
I-125	1.5e-04	1.3e-05	8.6e-05	3.5e-04	4.9e-04	2.9e-05	2.5e-06	1.7e-05	6.9e-05	9.5e-05
I-129	1.9e-04	1.7e-05	1.1e-04	4.5e-04	6.3e-04	3.7e-05	3.4e-06	2.2e-05	8.8e-05	1.2e-04
I-131	1.9e-02	2.6e-04	4.9e-03	4.9e-02	9.0e-02	3.8e-03	5.1e-05	9.7e-04	9.8e-03	1.7e-02
Cs-134	4.6e+00	6.2e-01	3.1e+00	1.0e+01	1.3e+01	9.0e-01	1.2e-01	6.2e-01	2.0e+00	2.6e+00
Cs-135	4.7e-05	6.4e-06	3.2e-05	1.1e-04	1.4e-04	9.3e-06	1.3e-06	6.3e-06	2.1e-05	2.6e-05
Cs-137	1.7e+00	2.3e-01	1.1e+00	3.8e+00	4.9e+00	3.3e-01	4.6e-02	2.3e-01	7.4e-01	9.5e-01
Ba-133	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.2e-01	8.1e-03	1.0e-03	5.3e-03	1.9e-02	2.4e-02
Ce-139	7.5e-03	9.2e-04	5.0e-03	1.7e-02	2.2e-02	1.5e-03	1.8e-04	9.8e-04	3.3e-03	4.4e-03
Ce-141	1.9e-03	2.0e-04	1.2e-03	4.3e-03	5.8e-03	3.7e-04	4.0e-05	2.3e-04	8.4e-04	1.1e-03
Ce-144	6.6e-03	8.2e-04	4.4e-03	1.5e-02	2.0e-02	1.3e-03	1.6e-04	8.7e-04	3.0e-03	3.9e-03
Pm-147	5.8e-07	7.5e-08	3.9e-07	1.3e-06	1.7e-06	1.1e-07	1.5e-08	7.7e-08	2.6e-07	3.4e-07

Table F2.19 Normalized effective doses from external exposure: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.9e-09	7.7e-10	4.0e-09	1.3e-08	1.8e-08	1.2e-09	1.5e-10	7.9e-10	2.6e-09	3.4e-09
Eu-152	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.7e-03	2.4e-02	8.0e-02	1.0e-01
Eu-154	1.8e-01	2.3e-02	1.2e-01	4.1e-01	5.2e-01	3.5e-02	4.6e-03	2.3e-02	7.8e-02	1.0e-01
Eu-155	1.4e-03	1.8e-04	9.4e-04	3.2e-03	4.2e-03	2.8e-04	3.6e-05	1.9e-04	6.3e-04	8.1e-04
Gd-153	1.6e-03	2.1e-04	1.1e-03	3.7e-03	4.9e-03	3.2e-04	4.1e-05	2.1e-04	7.2e-04	9.5e-04
Tb-160	1.2e-01	1.5e-02	8.2e-02	2.9e-01	3.7e-01	2.4e-02	3.0e-03	1.6e-02	5.6e-02	7.3e-02
Tm-170	9.9e-05	1.2e-05	6.7e-05	2.3e-04	3.0e-04	2.0e-05	2.5e-06	1.3e-05	4.4e-05	5.9e-05
Tm-171	4.6e-06	5.8e-07	3.1e-06	1.1e-05	1.4e-05	9.1e-07	1.2e-07	6.1e-07	2.1e-06	2.7e-06
Ta-182	1.6e-01	2.0e-02	1.1e-01	3.8e-01	4.9e-01	3.2e-02	4.0e-03	2.1e-02	7.4e-02	9.6e-02
W-181	6.2e-05	7.5e-06	4.0e-05	1.4e-04	1.9e-04	1.2e-05	1.5e-06	7.9e-06	2.8e-05	3.7e-05
W-185	9.7e-07	1.2e-07	6.2e-07	2.3e-06	3.0e-06	1.9e-07	2.3e-08	1.2e-07	4.4e-07	5.9e-07
Os-185	1.4e+00	2.0e-01	9.9e-01	3.3e+00	4.2e+00	2.9e-01	3.9e-02	1.9e-01	6.4e-01	8.3e-01
Ir-192	1.6e-02	1.8e-03	1.0e-02	3.7e-02	4.8e-02	3.1e-03	3.6e-04	2.0e-03	7.3e-03	9.4e-03
Tl-204	9.7e-04	1.3e-04	6.6e-04	2.2e-03	2.8e-03	1.9e-04	2.6e-05	1.3e-04	4.3e-04	5.4e-04
Pb-210	2.3e-03	3.1e-04	1.5e-03	5.2e-03	6.5e-03	4.5e-04	6.2e-05	3.1e-04	1.0e-03	1.3e-03
Bi-207	4.6e+00	6.2e-01	3.1e+00	1.1e+01	1.3e+01	9.0e-01	1.2e-01	6.2e-01	2.0e+00	2.6e+00
Po-210	2.5e-05	3.4e-06	1.7e-05	5.6e-05	7.2e-05	4.9e-06	6.7e-07	3.3e-06	1.1e-05	1.4e-05
Ra-226	2.8e-01	3.5e-02	1.9e-01	6.6e-01	8.3e-01	5.5e-02	7.1e-03	3.7e-02	1.3e-01	1.6e-01
Ra-228	1.4e-01	1.8e-02	9.6e-02	3.3e-01	4.3e-01	2.8e-02	3.6e-03	1.9e-02	6.6e-02	8.3e-02
Ac-227	4.3e-02	5.6e-03	2.9e-02	1.0e-01	1.3e-01	8.5e-03	1.1e-03	5.8e-03	2.0e-02	2.5e-02
Th-228	2.3e-01	2.9e-02	1.6e-01	5.3e-01	6.8e-01	4.6e-02	5.8e-03	3.1e-02	1.0e-01	1.3e-01
Th-229	3.1e-02	4.0e-03	2.1e-02	7.2e-02	9.2e-02	6.2e-03	7.9e-04	4.2e-03	1.4e-02	1.8e-02
Th-230	2.5e-05	2.9e-06	1.6e-05	5.7e-05	7.4e-05	4.9e-06	5.9e-07	3.2e-06	1.1e-05	1.5e-05
Th-232	1.8e-03	1.6e-04	1.1e-03	4.3e-03	5.8e-03	3.5e-04	3.3e-05	2.2e-04	8.5e-04	1.1e-03
Pa-231	3.7e-03	4.6e-04	2.5e-03	8.3e-03	1.1e-02	7.2e-04	9.2e-05	4.8e-04	1.6e-03	2.1e-03
U-232	9.0e-03	8.6e-04	5.5e-03	2.2e-02	2.9e-02	1.8e-03	1.7e-04	1.1e-03	4.3e-03	5.7e-03
U-233	1.5e-05	1.9e-06	1.0e-05	3.5e-05	4.5e-05	3.0e-06	3.9e-07	2.0e-06	5.9e-06	8.8e-06
U-234	3.0e-06	3.8e-07	2.0e-06	6.9e-06	8.7e-06	5.9e-07	7.7e-08	4.0e-07	1.3e-06	1.7e-06
U-235	1.2e-02	1.5e-03	8.0e-03	2.7e-02	3.5e-02	2.4e-03	3.1e-04	1.6e-03	5.4e-03	6.9e-03
U-236	1.3e-06	1.6e-07	8.7e-07	3.0e-06	3.8e-06	2.6e-07	3.3e-08	1.7e-07	5.8e-07	7.5e-07
U-238	3.8e-03	4.8e-04	2.5e-03	8.6e-03	1.1e-02	7.4e-04	9.6e-05	5.0e-04	1.7e-03	2.2e-03
Np-237	2.2e-02	2.8e-03	1.5e-02	5.1e-02	6.6e-02	4.4e-03	5.7e-04	3.0e-03	9.8e-03	1.3e-02
Pu-236	7.0e-06	5.3e-07	3.9e-06	1.7e-05	2.4e-05	1.4e-06	1.1e-07	7.7e-07	3.4e-06	4.6e-06
Pu-238	6.6e-07	8.2e-08	4.4e-07	1.5e-06	2.0e-06	1.3e-07	1.6e-08	8.7e-08	3.0e-07	3.9e-07
Pu-239	4.5e-06	5.5e-07	3.0e-06	1.0e-05	1.3e-05	8.8e-07	1.1e-07	5.9e-07	2.0e-06	2.6e-06
Pu-240	6.2e-07	7.7e-08	4.1e-07	1.4e-06	1.8e-06	1.2e-07	1.5e-08	8.2e-08	2.8e-07	3.6e-07
Pu-241	9.0e-08	1.1e-08	5.9e-08	2.1e-07	2.7e-07	1.8e-08	2.2e-09	1.2e-08	4.0e-08	5.1e-08
Pu-242	5.6e-07	7.0e-08	3.8e-07	1.3e-06	1.7e-06	1.1e-07	1.4e-08	7.5e-08	2.5e-07	3.3e-07
Pu-244	4.9e-02	6.1e-03	3.3e-02	1.1e-01	1.5e-01	9.7e-03	1.2e-03	6.5e-03	2.2e-02	2.9e-02
Am-241	2.1e-04	2.6e-05	1.4e-04	4.7e-04	6.1e-04	4.1e-05	5.2e-06	2.7e-05	9.1e-05	1.2e-04
Am-242m	9.5e-04	1.2e-04	6.3e-04	2.1e-03	2.8e-03	1.9e-04	2.4e-05	1.2e-04	4.2e-04	5.4e-04
Am-243	1.3e-02	1.6e-03	8.6e-03	2.9e-02	3.8e-02	2.6e-03	3.3e-04	1.7e-03	5.7e-03	7.4e-03
Cm-242	6.9e-07	8.8e-08	4.6e-07	1.6e-06	2.1e-06	1.4e-07	1.8e-08	9.0e-08	3.2e-07	4.1e-07
Cm-243	9.2e-03	1.2e-03	6.1e-03	2.1e-02	2.7e-02	1.8e-03	2.4e-04	1.2e-03	4.2e-03	5.4e-03
Cm-244	6.9e-07	8.8e-08	4.6e-07	1.6e-06	2.0e-06	1.4e-07	1.8e-08	8.9e-08	3.1e-07	4.0e-07
Cm-245	4.0e-03	5.2e-04	2.7e-03	9.4e-03	1.2e-02	7.9e-04	1.0e-04	5.3e-04	1.8e-03	2.3e-03
Cm-246	2.4e-07	3.1e-08	1.6e-07	5.6e-07	7.2e-07	4.8e-08	6.2e-09	3.2e-08	1.1e-07	1.4e-07
Cm-247	4.1e-02	5.3e-03	2.7e-02	9.6e-02	1.2e-01	8.1e-03	1.1e-03	5.4e-03	1.9e-02	2.4e-02
Cm-248	2.2e-07	2.9e-08	1.5e-07	5.2e-07	6.6e-07	4.4e-08	5.7e-09	2.9e-08	1.0e-07	1.3e-07
Bk-249	8.1e-06	7.6e-07	5.0e-06	2.0e-05	2.6e-05	1.6e-06	1.5e-07	9.8e-07	3.8e-06	5.1e-06
Cf-248	8.5e-07	1.1e-07	5.7e-07	2.0e-06	2.6e-06	1.7e-07	2.2e-08	1.1e-07	3.9e-07	5.0e-07
Cf-249	4.0e-02	5.2e-03	2.7e-02	9.3e-02	1.2e-01	7.9e-03	1.1e-03	5.3e-03	1.8e-02	2.3e-02
Cf-250	2.7e-07	3.5e-08	1.8e-07	6.3e-07	8.0e-07	5.3e-08	7.1e-09	3.6e-08	1.2e-07	1.6e-07
Cf-251	6.8e-03	8.9e-04	4.6e-03	1.6e-02	2.0e-02	1.3e-03	1.8e-04	9.0e-04	3.1e-03	3.9e-03
Cf-252	8.6e-07	1.1e-07	5.8e-07	2.0e-06	2.6e-06	1.7e-07	2.3e-08	1.1e-07	3.9e-07	5.0e-07
Cf-254	1.8e+00	2.4e-01	1.2e+00	4.3e+00	5.5e+00	3.6e-01	4.6e-02	2.4e-01	8.4e-01	1.1e+00
Es-254	1.4e-01	1.7e-02	9.1e-02	3.1e-01	4.1e-01	2.7e-02	3.5e-03	1.8e-02	6.2e-02	8.0e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.20 Normalized effective doses from inhalation: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.3e-04	1.7e-05	8.7e-05	3.0e-04	3.8e-04	2.5e-05	3.3e-06	1.7e-05	5.8e-05	7.3e-05
P-32	9.0e-07	5.2e-08	4.4e-07	2.2e-06	3.4e-06	1.8e-07	1.0e-08	8.7e-08	4.4e-07	6.5e-07
S-35	3.2e-06	3.5e-07	2.0e-06	7.2e-06	9.9e-06	6.2e-07	7.0e-08	4.0e-07	1.4e-06	1.9e-06
Cl-36	1.6e-04	1.5e-05	9.9e-05	3.9e-04	5.4e-04	3.2e-05	3.0e-06	2.0e-05	7.5e-05	1.1e-04
K-40	2.0e-04	2.6e-05	1.3e-04	4.5e-04	5.8e-04	3.9e-05	5.1e-06	2.6e-05	8.8e-05	1.1e-04
Ca-41	1.2e-06	1.5e-07	8.2e-07	2.8e-06	3.7e-06	2.4e-07	3.0e-08	1.6e-07	5.5e-07	7.1e-07
Ca-45	1.3e-05	1.5e-06	8.5e-06	2.9e-05	3.8e-05	2.5e-06	3.0e-07	1.7e-06	5.7e-06	7.3e-06
Sc-46	2.3e-05	2.6e-06	1.5e-05	5.3e-05	6.9e-05	4.5e-06	5.2e-07	2.9e-06	1.0e-05	1.4e-05
Cr-51	4.2e-08	3.8e-09	2.4e-08	1.0e-07	1.4e-07	8.2e-09	7.7e-10	4.9e-09	2.0e-08	2.7e-08
Mn-53	1.7e-07	2.2e-08	1.1e-07	3.8e-07	4.9e-07	3.3e-08	4.3e-09	2.2e-08	7.5e-08	9.7e-08
Mn-54	5.2e-06	6.7e-07	3.4e-06	1.2e-05	1.5e-05	1.0e-06	1.3e-07	6.8e-07	2.3e-06	2.9e-06
Fe-55	4.5e-07	5.1e-08	2.9e-07	1.0e-06	1.4e-06	8.9e-08	1.0e-08	5.8e-08	2.0e-07	2.7e-07
Fe-59	2.5e-06	2.6e-07	1.6e-06	5.9e-06	8.0e-06	5.0e-07	5.3e-08	3.1e-07	1.1e-06	1.6e-06
Co-56	5.0e-06	5.4e-07	3.1e-06	1.2e-05	1.6e-05	9.7e-07	1.1e-07	6.0e-07	2.3e-06	3.0e-06
Co-57	7.7e-07	8.5e-08	4.8e-07	1.8e-06	2.4e-06	1.5e-07	1.7e-08	9.4e-08	3.6e-07	4.7e-07
Co-58	1.7e-06	1.8e-07	1.0e-06	3.9e-06	5.2e-06	3.3e-07	3.6e-08	2.0e-07	7.8e-07	1.0e-06
Co-60	2.4e-05	2.7e-06	1.5e-05	5.6e-05	7.4e-05	4.6e-06	5.3e-07	2.9e-06	1.1e-05	1.5e-05
Ni-59	1.3e-07	1.5e-08	8.6e-08	3.0e-07	4.1e-07	2.6e-08	3.0e-09	1.7e-08	6.0e-08	8.2e-08
Ni-63	4.3e-07	4.8e-08	2.8e-07	1.0e-06	1.4e-06	8.5e-08	9.8e-09	5.6e-08	2.0e-07	2.7e-07
Zn-65	3.0e-04	4.0e-05	2.0e-04	6.9e-04	8.8e-04	6.0e-05	7.9e-06	4.0e-05	1.3e-04	1.8e-04
As-73	1.9e-05	2.1e-06	1.2e-05	4.5e-05	5.9e-05	3.7e-06	4.1e-07	2.4e-06	8.7e-06	1.2e-05
Se-75	1.7e-04	2.2e-05	1.1e-04	3.9e-04	5.0e-04	3.4e-05	4.5e-06	2.3e-05	7.7e-05	9.8e-05
Sr-85	2.4e-06	2.9e-07	1.6e-06	5.6e-06	7.7e-06	4.8e-07	5.6e-08	3.1e-07	1.1e-06	1.5e-06
Sr-89	5.5e-06	6.1e-07	3.5e-06	1.3e-05	1.8e-05	1.1e-06	1.2e-07	6.9e-07	2.5e-06	3.4e-06
Sr-90	2.1e-04	2.5e-05	1.3e-04	4.7e-04	6.3e-04	4.0e-05	4.9e-06	2.6e-05	9.2e-05	1.2e-04
Y-91	2.6e-05	3.0e-06	1.6e-05	6.0e-05	7.9e-05	5.1e-06	5.8e-07	3.2e-06	1.2e-05	1.5e-05
Zr-93	4.3e-05	5.1e-06	2.8e-05	9.9e-05	1.3e-04	8.4e-06	1.0e-06	5.5e-06	1.9e-05	2.5e-05
Zr-95	1.9e-05	2.3e-06	1.2e-05	4.4e-05	5.8e-05	3.7e-06	4.5e-07	2.4e-06	8.6e-06	1.1e-05
Nb-93m	5.6e-06	7.0e-07	3.7e-06	1.3e-05	1.7e-05	1.1e-06	1.4e-07	7.2e-07	2.5e-06	3.3e-06
Nb-94	1.6e-04	2.1e-05	1.1e-04	3.7e-04	4.9e-04	3.2e-05	4.1e-06	2.1e-05	7.3e-05	9.5e-05
Nb-95	4.1e-06	4.4e-07	2.6e-06	9.6e-06	1.3e-05	8.1e-07	8.7e-08	5.1e-07	1.9e-06	2.6e-06
Mo-93	1.7e-06	1.9e-07	1.1e-06	4.0e-06	5.3e-06	3.4e-07	3.8e-08	2.1e-07	7.8e-07	1.0e-06
Tc-97	2.3e-07	2.5e-08	1.5e-07	5.3e-07	7.0e-07	4.5e-08	5.0e-09	2.8e-08	1.0e-07	1.4e-07
Tc-97m	2.8e-06	3.2e-07	1.8e-06	6.7e-06	8.8e-06	5.6e-07	6.2e-08	3.5e-07	1.3e-06	1.7e-06
Tc-99	4.6e-06	5.1e-07	2.9e-06	1.1e-05	1.4e-05	9.0e-07	1.0e-07	5.7e-07	2.1e-06	2.8e-06
Ru-103	1.6e-06	1.6e-07	9.9e-07	3.7e-06	5.2e-06	3.2e-07	3.2e-08	2.0e-07	7.3e-07	1.0e-06
Ru-106	4.6e-05	5.2e-06	2.9e-05	1.1e-04	1.4e-04	9.0e-06	1.0e-06	5.7e-06	2.1e-05	2.7e-05
Ag-108m	1.3e-04	1.3e-05	7.6e-05	2.9e-04	4.0e-04	2.5e-05	2.6e-06	1.5e-05	5.8e-05	7.9e-05
Ag-110m	1.0e-04	1.0e-05	6.3e-05	2.4e-04	3.3e-04	2.0e-05	2.1e-06	1.2e-05	4.8e-05	6.5e-05
Cd-109	5.5e-04	7.3e-05	3.7e-04	1.3e-03	1.6e-03	1.1e-04	1.4e-05	7.3e-05	2.5e-04	3.1e-04
Sn-113	2.2e-06	2.5e-07	1.4e-06	5.0e-06	6.7e-06	4.3e-07	4.9e-08	2.7e-07	9.8e-07	1.3e-06
Sb-124	4.3e-05	4.1e-06	2.6e-05	1.0e-04	1.4e-04	8.4e-06	8.2e-07	5.1e-06	2.0e-05	2.7e-05
Sb-125	5.4e-05	5.5e-06	3.3e-05	1.3e-04	1.7e-04	1.1e-05	1.1e-06	6.5e-06	2.5e-05	3.4e-05
Te-123m	3.5e-04	4.5e-05	2.3e-04	7.9e-04	1.0e-03	6.8e-05	8.9e-06	4.5e-05	1.5e-04	2.0e-04
Te-127m	8.3e-04	8.2e-05	4.2e-04	1.5e-03	1.8e-03	1.2e-04	1.6e-05	8.3e-05	2.8e-04	3.6e-04
I-125	1.5e-04	1.2e-05	8.8e-05	3.6e-04	5.1e-04	3.0e-05	2.4e-06	1.7e-05	7.1e-05	1.0e-04
I-129	1.6e-03	1.3e-04	9.5e-04	3.9e-03	5.5e-03	3.2e-04	2.7e-05	1.9e-04	7.6e-04	1.1e-03
I-131	2.8e-05	3.7e-07	7.0e-06	7.2e-05	1.3e-04	5.6e-06	7.3e-08	1.4e-06	1.4e-05	2.5e-05
Cs-134	1.2e-03	1.6e-04	8.0e-04	2.7e-03	3.5e-03	2.4e-04	3.1e-05	1.6e-04	5.4e-04	6.9e-04
Cs-135	1.3e-04	1.7e-05	8.6e-05	2.9e-04	3.7e-04	2.5e-05	3.4e-06	1.7e-05	5.7e-05	7.3e-05
Cs-137	8.7e-04	1.2e-04	5.8e-04	2.0e-03	2.5e-03	1.7e-04	2.3e-05	1.1e-04	3.9e-04	5.0e-04
Ba-133	1.2e-05	1.4e-06	7.5e-06	2.7e-05	3.6e-05	2.3e-06	2.8e-07	1.5e-06	5.3e-06	7.0e-06
Ce-139	7.6e-06	9.0e-07	4.8e-06	1.7e-05	2.3e-05	1.5e-06	1.8e-07	9.5e-07	3.4e-06	4.4e-06
Ce-141	9.4e-06	9.5e-07	5.9e-06	2.2e-05	3.0e-05	1.9e-06	1.9e-07	1.2e-06	4.3e-06	5.8e-06
Ce-144	1.7e-04	2.1e-05	1.1e-04	4.0e-04	5.3e-04	3.4e-05	4.1e-06	2.2e-05	7.9e-05	1.0e-04
Pm-147	2.0e-05	2.5e-06	1.3e-05	4.7e-05	6.1e-05	4.0e-06	4.8e-07	2.6e-06	9.2e-06	1.2e-05

Table F2.20 Normalized effective doses from inhalation: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-05	2.1e-06	1.1e-05	3.9e-05	5.1e-05	3.3e-06	4.1e-07	2.2e-06	7.5e-06	1.0e-05
Eu-152	1.8e-04	2.1e-05	1.1e-04	4.0e-04	5.4e-04	3.5e-05	4.3e-06	2.2e-05	7.6e-05	1.0e-04
Eu-154	2.3e-04	2.8e-05	1.5e-04	5.2e-04	6.9e-04	4.5e-05	5.6e-06	2.9e-05	1.0e-04	1.3e-04
Eu-155	3.0e-05	3.7e-06	2.0e-05	6.9e-05	9.2e-05	6.0e-06	7.4e-07	3.9e-06	1.4e-05	1.8e-05
Gd-153	8.2e-06	1.0e-06	5.3e-06	1.9e-05	2.4e-05	1.6e-06	2.0e-07	1.0e-06	3.7e-06	4.8e-06
Tb-160	2.5e-05	2.9e-06	1.6e-05	5.6e-05	7.4e-05	4.8e-06	5.6e-07	3.1e-06	1.1e-05	1.4e-05
Tm-170	2.8e-05	3.3e-06	1.8e-05	6.4e-05	8.6e-05	5.5e-06	6.6e-07	3.6e-06	1.3e-05	1.7e-05
Tm-171	5.8e-06	7.1e-07	3.7e-06	1.3e-05	1.7e-05	1.1e-06	1.4e-07	7.4e-07	2.6e-06	3.4e-06
Ta-182	3.9e-05	4.5e-06	2.5e-05	8.9e-05	1.2e-04	7.6e-06	9.1e-07	5.0e-06	1.7e-05	2.3e-05
W-181	4.9e-08	5.7e-09	3.1e-08	1.1e-07	1.5e-07	9.7e-09	1.1e-09	6.2e-09	2.2e-08	3.0e-08
W-185	2.2e-07	2.5e-08	1.4e-07	5.1e-07	7.0e-07	4.4e-08	4.9e-09	2.8e-08	1.0e-07	1.4e-07
Os-185	1.1e-04	1.4e-05	6.9e-05	2.4e-04	3.1e-04	2.1e-05	2.7e-06	1.4e-05	4.7e-05	6.0e-05
Ir-192	4.9e-06	5.5e-07	3.1e-06	1.1e-05	1.5e-05	9.7e-07	1.1e-07	6.2e-07	2.2e-06	3.0e-06
Tl-204	7.7e-05	1.0e-05	5.2e-05	1.8e-04	2.2e-04	1.5e-05	2.0e-06	1.0e-05	3.4e-05	4.4e-05
Pb-210	4.2e-01	5.6e-02	2.8e-01	9.6e-01	1.2e+00	8.3e-02	1.1e-02	5.6e-02	1.9e-01	2.4e-01
Bi-207	4.0e-04	5.4e-05	2.7e-04	9.2e-04	1.2e-03	8.0e-05	1.1e-05	5.4e-05	1.8e-04	2.3e-04
Po-210	2.3e-01	3.0e-02	1.5e-01	5.2e-01	6.7e-01	4.5e-02	6.0e-03	3.0e-02	1.0e-01	1.3e-01
Ra-226	1.5e-02	1.8e-03	9.5e-03	3.4e-02	4.4e-02	2.9e-03	3.6e-04	1.9e-03	6.6e-03	8.7e-03
Ra-228	1.9e-02	2.2e-03	1.2e-02	4.5e-02	6.1e-02	3.8e-03	4.5e-04	2.5e-03	8.7e-03	1.2e-02
Ac-227	3.9e-01	4.8e-02	2.6e-01	9.0e-01	1.2e+00	7.7e-02	9.4e-03	5.0e-02	1.8e-01	2.3e-01
Th-228	2.2e-01	2.7e-02	1.4e-01	4.9e-01	6.5e-01	4.3e-02	5.3e-03	2.8e-02	9.7e-02	1.3e-01
Th-229	3.9e-01	4.8e-02	2.5e-01	8.9e-01	1.2e+00	7.6e-02	9.6e-03	5.0e-02	1.7e-01	2.2e-01
Th-230	4.7e-02	5.8e-03	3.1e-02	1.1e-01	1.4e-01	9.3e-03	1.2e-03	6.1e-03	2.1e-02	2.7e-02
Th-232	7.9e-02	9.7e-03	5.1e-02	1.8e-01	2.3e-01	1.6e-02	1.9e-03	1.0e-02	3.5e-02	4.6e-02
Pa-231	1.1e-01	1.3e-02	7.4e-02	2.6e-01	3.4e-01	2.2e-02	2.7e-03	1.5e-02	5.0e-02	6.6e-02
U-232	1.8e-01	2.2e-02	1.2e-01	4.1e-01	5.3e-01	3.5e-02	4.3e-03	2.3e-02	8.0e-02	1.0e-01
U-233	5.5e-02	5.5e-03	2.9e-02	1.0e-01	1.3e-01	8.8e-03	1.1e-03	5.9e-03	2.0e-02	2.6e-02
U-234	4.4e-02	5.4e-03	2.9e-02	1.0e-01	1.3e-01	8.7e-03	1.1e-03	5.8e-03	2.0e-02	2.6e-02
U-235	4.0e-02	4.9e-03	2.6e-02	9.1e-02	1.2e-01	7.8e-03	9.7e-04	5.2e-03	1.8e-02	2.3e-02
U-236	4.1e-02	5.0e-03	2.7e-02	9.4e-02	1.2e-01	8.1e-03	1.0e-03	5.4e-03	1.9e-02	2.4e-02
U-238	3.7e-02	4.6e-03	2.4e-02	8.6e-02	1.1e-01	7.3e-03	9.1e-04	4.9e-03	1.7e-02	2.2e-02
Np-237	9.8e-02	1.2e-02	6.3e-02	2.3e-01	3.0e-01	1.9e-02	2.4e-03	1.3e-02	4.4e-02	5.8e-02
Pu-236	4.7e-02	5.7e-03	3.1e-02	1.1e-01	1.4e-01	9.3e-03	1.1e-03	6.1e-03	2.1e-02	2.8e-02
Pu-238	7.2e-02	8.7e-03	4.6e-02	1.7e-01	2.2e-01	1.4e-02	1.7e-03	9.2e-03	3.3e-02	4.2e-02
Pu-239	5.4e-02	6.6e-03	3.5e-02	1.3e-01	1.6e-01	1.1e-02	1.3e-03	7.0e-03	2.5e-02	3.2e-02
Pu-240	5.4e-02	6.6e-03	3.5e-02	1.3e-01	1.6e-01	1.1e-02	1.3e-03	7.0e-03	2.5e-02	3.2e-02
Pu-241	5.8e-04	7.0e-05	3.7e-04	1.3e-03	1.7e-03	1.1e-04	1.4e-05	7.4e-05	2.6e-04	3.4e-04
Pu-242	5.0e-02	6.1e-03	3.2e-02	1.2e-01	1.5e-01	9.9e-03	1.2e-03	6.5e-03	2.3e-02	3.0e-02
Pu-244	4.8e-02	5.9e-03	3.1e-02	1.1e-01	1.5e-01	9.5e-03	1.2e-03	6.2e-03	2.2e-02	2.9e-02
Am-241	1.7e-01	2.1e-02	1.1e-01	4.0e-01	5.3e-01	3.4e-02	4.2e-03	2.3e-02	7.8e-02	1.0e-01
Am-242m	1.8e-01	2.1e-02	1.1e-01	4.0e-01	5.3e-01	3.4e-02	4.2e-03	2.3e-02	7.8e-02	1.0e-01
Am-243	1.7e-01	2.1e-02	1.1e-01	4.0e-01	5.3e-01	3.4e-02	4.2e-03	2.3e-02	7.8e-02	1.0e-01
Cm-242	2.1e-02	2.5e-03	1.3e-02	4.8e-02	6.2e-02	4.0e-03	4.9e-04	2.6e-03	9.4e-03	1.2e-02
Cm-243	1.3e-01	1.6e-02	8.3e-02	3.1e-01	3.9e-01	2.6e-02	3.1e-03	1.6e-02	6.0e-02	7.7e-02
Cm-244	1.1e-01	1.4e-02	7.1e-02	2.6e-01	3.3e-01	2.2e-02	2.7e-03	1.4e-02	5.1e-02	6.5e-02
Cm-245	1.8e-01	2.2e-02	1.1e-01	4.1e-01	5.3e-01	3.5e-02	4.2e-03	2.2e-02	8.1e-02	1.0e-01
Cm-246	1.8e-01	2.2e-02	1.1e-01	4.1e-01	5.3e-01	3.5e-02	4.2e-03	2.2e-02	8.1e-02	1.0e-01
Cm-247	1.6e-01	2.0e-02	1.0e-01	3.8e-01	4.9e-01	3.2e-02	3.9e-03	2.1e-02	7.5e-02	9.7e-02
Cm-248	6.2e-01	7.6e-02	4.0e-01	1.5e+00	1.9e+00	1.2e-01	1.5e-02	7.9e-02	2.9e-01	3.7e-01
Bk-249	6.6e-04	8.2e-05	4.2e-04	1.5e-03	2.0e-03	1.3e-04	1.6e-05	8.3e-05	2.9e-04	3.9e-04
Cf-248	3.7e-02	4.5e-03	2.4e-02	8.5e-02	1.1e-01	7.3e-03	9.0e-04	4.8e-03	1.7e-02	2.2e-02
Cf-249	2.9e-01	3.6e-02	1.9e-01	6.7e-01	8.7e-01	5.8e-02	7.1e-03	3.8e-02	1.3e-01	1.7e-01
Cf-250	1.4e-01	1.7e-02	9.3e-02	3.3e-01	4.3e-01	2.8e-02	3.4e-03	1.8e-02	6.4e-02	8.3e-02
Cf-251	3.0e-01	3.7e-02	2.0e-01	6.9e-01	8.9e-01	5.9e-02	7.2e-03	3.9e-02	1.3e-01	1.7e-01
Cf-252	8.2e-02	1.0e-02	5.3e-02	1.9e-01	2.5e-01	1.6e-02	2.0e-03	1.1e-02	3.7e-02	4.8e-02
Cf-254	9.3e-02	1.1e-02	6.0e-02	2.1e-01	2.9e-01	1.8e-02	2.2e-03	1.2e-02	4.2e-02	5.6e-02
Es-254	3.7e-02	4.4e-03	2.4e-02	8.6e-02	1.1e-01	7.2e-03	8.8e-04	4.7e-03	1.7e-02	2.2e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.21 Normalized effective doses from ingestion: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	8.9e-04	3.2e-05	3.9e-04	1.7e-03	2.4e-03	1.4e-04	6.3e-06	7.7e-05	3.4e-04	4.6e-04
P-32	8.6e-06	1.7e-07	2.7e-06	1.6e-05	2.8e-05	1.3e-06	3.4e-08	5.3e-07	3.2e-06	5.4e-06
S-35	1.3e-06	5.6e-08	7.2e-07	3.3e-06	4.7e-06	2.6e-07	1.1e-08	1.4e-07	6.6e-07	9.1e-07
Cl-38	9.9e-05	3.7e-06	5.1e-05	2.5e-04	3.7e-04	1.9e-05	7.3e-07	1.0e-05	5.0e-05	7.2e-05
K-40	1.4e-03	6.5e-05	7.6e-04	3.4e-03	4.7e-03	2.7e-04	1.3e-05	1.5e-04	6.7e-04	9.2e-04
Ca-41	6.3e-06	2.9e-07	3.4e-06	1.6e-05	2.2e-05	1.2e-06	5.6e-08	6.9e-07	3.1e-06	4.4e-06
Ca-45	1.4e-05	6.4e-07	7.7e-06	3.6e-05	4.8e-05	2.8e-06	1.3e-07	1.5e-06	7.0e-06	9.7e-06
Sc-46	2.4e-05	1.0e-06	1.3e-05	6.1e-05	8.4e-05	4.7e-06	2.1e-07	2.6e-06	1.2e-05	1.6e-05
Cr-51	1.5e-07	5.5e-09	7.1e-08	3.7e-07	5.4e-07	2.9e-08	1.1e-09	1.4e-08	7.2e-08	1.0e-07
Mn-53	4.7e-07	2.2e-08	2.6e-07	1.2e-06	1.6e-06	9.2e-08	4.3e-09	5.2e-08	2.3e-07	3.1e-07
Mn-54	1.0e-05	4.8e-07	5.6e-06	2.5e-05	3.5e-05	2.0e-06	9.2e-08	1.1e-06	5.0e-06	6.8e-06
Fe-55	1.5e-06	6.4e-08	8.1e-07	3.8e-06	5.2e-06	3.0e-07	1.3e-08	1.6e-07	7.5e-07	1.0e-06
Fe-59	4.8e-06	1.9e-07	2.5e-06	1.2e-05	1.7e-05	9.4e-07	3.7e-08	4.9e-07	2.4e-06	3.4e-06
Co-56	7.8e-06	3.3e-07	4.1e-06	2.0e-05	2.8e-05	1.5e-06	6.6e-08	8.1e-07	3.8e-06	5.3e-06
Co-57	8.1e-07	3.4e-08	4.3e-07	2.0e-06	2.9e-06	1.6e-07	6.8e-09	8.4e-08	4.0e-07	5.5e-07
Co-58	2.3e-06	9.7e-08	1.2e-06	5.7e-06	8.1e-06	4.5e-07	1.9e-08	2.4e-07	1.1e-06	1.6e-06
Co-60	1.2e-05	5.0e-07	6.1e-06	2.9e-05	4.1e-05	2.3e-06	9.7e-08	1.2e-06	5.8e-06	8.0e-06
Ni-59	3.0e-07	1.4e-08	1.6e-07	7.4e-07	1.0e-06	5.8e-08	2.6e-09	3.1e-08	1.5e-07	2.0e-07
Ni-63	7.0e-07	3.2e-08	3.8e-07	1.8e-06	2.5e-06	1.4e-07	6.3e-09	7.5e-08	3.5e-07	4.9e-07
Zn-65	1.4e-03	6.6e-05	7.9e-04	3.5e-03	4.9e-03	2.8e-04	1.3e-05	1.6e-04	7.0e-04	9.4e-04
As-73	2.5e-05	1.1e-06	1.4e-05	6.5e-05	8.7e-05	5.0e-06	2.2e-07	2.7e-06	1.3e-05	1.7e-05
Se-75	8.8e-04	4.1e-05	4.9e-04	2.2e-03	3.0e-03	1.7e-04	8.2e-06	9.7e-05	4.3e-04	5.9e-04
Sr-85	8.2e-06	3.7e-07	4.4e-06	2.1e-05	2.9e-05	1.6e-06	7.4e-08	8.6e-07	4.0e-06	5.5e-06
Sr-89	3.4e-05	1.5e-06	1.8e-05	8.6e-05	1.2e-04	6.7e-06	3.0e-07	3.6e-06	1.7e-05	2.3e-05
Sr-90	8.7e-04	3.0e-05	3.6e-04	1.7e-03	2.3e-03	1.3e-04	5.9e-06	7.2e-05	3.3e-04	4.4e-04
Y-91	3.4e-05	1.5e-06	1.8e-05	8.6e-05	1.2e-04	6.7e-06	3.1e-07	3.6e-06	1.7e-05	2.3e-05
Zr-93	8.1e-06	2.7e-07	3.3e-06	1.5e-05	2.1e-05	1.2e-06	5.4e-08	6.6e-07	3.0e-06	4.1e-06
Zr-95	1.8e-05	7.8e-07	9.6e-06	4.4e-05	6.1e-05	3.5e-06	1.8e-07	1.9e-06	8.7e-06	1.2e-05
Nb-93m	2.6e-06	1.1e-07	1.4e-06	6.4e-06	9.2e-06	5.1e-07	2.3e-08	2.8e-07	1.3e-06	1.8e-06
Nb-94	3.7e-05	1.6e-06	2.0e-05	9.2e-05	1.3e-04	7.3e-06	3.2e-07	4.0e-06	1.8e-05	2.5e-05
Nb-95	8.2e-06	2.5e-07	3.2e-06	1.5e-05	2.2e-05	1.2e-06	5.2e-08	6.3e-07	3.1e-06	4.3e-06
Mo-93	1.2e-05	5.3e-07	6.6e-06	3.1e-05	4.3e-05	2.4e-06	1.1e-07	1.3e-06	6.1e-06	8.4e-06
Tc-97	3.9e-07	1.6e-08	2.1e-07	1.0e-06	1.4e-06	7.7e-08	3.3e-09	4.2e-08	2.0e-07	2.7e-07
Tc-97m	2.3e-06	9.8e-08	1.3e-06	5.9e-06	8.2e-06	4.5e-07	1.9e-08	2.5e-07	1.2e-06	1.6e-06
Tc-99	3.7e-06	1.5e-07	2.0e-06	9.4e-06	1.3e-05	7.2e-07	3.1e-08	3.9e-07	1.9e-06	2.5e-06
Ru-103	1.8e-06	7.1e-08	9.3e-07	4.5e-06	6.4e-06	3.5e-07	1.4e-08	1.8e-07	8.8e-07	1.3e-06
Ru-106	3.0e-05	1.3e-06	1.6e-05	7.7e-05	1.1e-04	6.0e-06	2.6e-07	3.3e-06	1.5e-05	2.1e-05
Ag-108m	1.3e-04	5.1e-06	6.7e-05	3.3e-04	4.6e-04	2.6e-05	9.9e-07	1.3e-05	6.6e-05	9.0e-05
Ag-110m	1.4e-04	5.5e-06	7.4e-05	3.7e-04	5.0e-04	2.8e-05	1.1e-06	1.5e-05	7.2e-05	9.9e-05
Cd-109	8.4e-04	3.9e-05	4.7e-04	2.1e-03	2.9e-03	1.6e-04	7.8e-06	9.2e-05	4.1e-04	5.5e-04
Sn-113	2.9e-06	1.2e-07	1.6e-06	7.2e-06	1.0e-05	5.6e-07	2.4e-08	3.1e-07	1.4e-06	2.0e-06
Sb-124	7.6e-05	2.8e-06	3.8e-05	1.9e-04	2.9e-04	1.5e-05	5.6e-07	7.5e-06	3.8e-05	5.7e-05
Sb-125	5.9e-05	2.3e-06	3.1e-05	1.5e-04	2.2e-04	1.2e-05	4.5e-07	6.0e-06	2.9e-05	4.2e-05
Te-123m	4.7e-04	2.2e-05	2.6e-04	1.2e-03	1.6e-03	9.3e-05	4.4e-06	5.2e-05	2.3e-04	3.2e-04
Te-127m	8.2e-04	3.8e-05	4.5e-04	2.1e-03	2.8e-03	1.6e-04	7.6e-06	9.0e-05	4.0e-04	5.5e-04
I-125	1.0e-03	3.3e-05	5.1e-04	2.6e-03	3.9e-03	2.0e-04	6.5e-06	1.0e-04	5.1e-04	7.6e-04
I-129	1.2e-02	3.9e-04	5.9e-03	2.9e-02	4.3e-02	2.3e-03	7.7e-05	1.2e-03	5.8e-03	8.4e-03
I-131	1.9e-04	1.1e-06	3.8e-05	4.8e-04	8.7e-04	3.7e-05	2.3e-07	7.5e-06	9.6e-05	1.7e-04
Cs-134	7.9e-03	3.7e-04	4.4e-03	2.0e-02	2.7e-02	1.6e-03	7.4e-05	8.8e-04	3.9e-03	5.3e-03
Cs-135	8.7e-04	4.1e-05	4.8e-04	2.2e-03	3.0e-03	1.7e-04	7.9e-06	9.6e-05	4.3e-04	5.7e-04
Cs-137	5.6e-03	2.6e-04	3.1e-03	1.4e-02	1.9e-02	1.1e-03	5.1e-05	6.2e-04	2.8e-03	3.7e-03
Ba-133	2.2e-05	9.8e-07	1.2e-05	5.4e-05	7.4e-05	4.3e-06	2.0e-07	2.3e-06	1.1e-05	1.5e-05
Ce-139	4.7e-06	2.1e-07	2.5e-06	1.2e-05	1.6e-05	9.3e-07	4.1e-08	5.0e-07	2.3e-06	3.1e-06
Ce-141	7.2e-06	2.9e-07	3.7e-06	1.8e-05	2.6e-05	1.4e-06	5.6e-08	7.3e-07	3.5e-06	5.1e-06
Ce-144	1.0e-04	4.6e-06	5.6e-05	2.7e-04	3.6e-04	2.1e-05	9.2e-07	1.1e-05	5.2e-05	7.0e-05
Pm-147	5.6e-06	2.5e-07	3.0e-06	1.4e-05	2.0e-05	1.1e-06	5.0e-08	5.9e-07	2.8e-06	3.8e-06

Table F2.21 Normalized effective doses from ingestion: Processing EAF dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.1e-06	9.4e-08	1.2e-06	5.3e-06	7.4e-06	4.2e-07	1.8e-08	2.3e-07	1.0e-06	1.5e-06
Eu-152	3.0e-05	1.4e-06	1.6e-05	7.5e-05	1.1e-04	6.0e-06	2.7e-07	3.2e-06	1.5e-05	2.1e-05
Eu-154	4.3e-05	2.0e-06	2.3e-05	1.1e-04	1.5e-04	8.5e-06	3.8e-07	4.6e-06	2.1e-05	2.9e-05
Eu-155	6.9e-06	3.1e-07	3.7e-06	1.7e-05	2.4e-05	1.3e-06	6.1e-08	7.3e-07	3.4e-06	4.7e-06
Gd-153	5.2e-06	2.4e-07	2.8e-06	1.3e-05	1.8e-05	1.0e-06	4.8e-08	5.6e-07	2.6e-06	3.5e-06
Tb-160	2.4e-05	1.1e-06	1.3e-05	6.3e-05	8.6e-05	4.8e-06	2.3e-07	2.6e-06	1.2e-05	1.7e-05
Tm-170	2.3e-05	1.0e-06	1.3e-05	5.9e-05	8.1e-05	4.6e-06	2.0e-07	2.5e-06	1.2e-05	1.6e-05
Tm-171	2.3e-06	1.0e-07	1.3e-06	5.8e-06	8.1e-06	4.6e-07	2.0e-08	2.5e-07	1.1e-06	1.6e-06
Ta-182	2.6e-05	1.2e-06	1.4e-05	6.6e-05	9.1e-05	5.2e-06	2.3e-07	2.9e-06	1.3e-05	1.8e-05
W-181	2.9e-07	1.3e-08	1.5e-07	7.3e-07	1.0e-06	5.7e-08	2.6e-09	3.1e-08	1.4e-07	2.0e-07
W-185	1.5e-06	6.6e-08	7.8e-07	3.7e-06	5.4e-06	2.9e-07	1.3e-08	1.5e-07	7.4e-07	1.0e-06
Re-185	1.6e-04	7.5e-06	9.0e-05	4.1e-04	5.5e-04	3.2e-05	1.5e-06	1.8e-05	8.0e-05	1.1e-04
Ir-192	4.7e-06	2.0e-07	2.5e-06	1.2e-05	1.6e-05	9.2e-07	3.9e-08	4.9e-07	2.3e-06	3.2e-06
Tl-204	5.4e-04	2.5e-05	3.0e-04	1.3e-03	1.9e-03	1.1e-04	5.0e-06	6.0e-05	2.7e-04	3.6e-04
Pb-210	3.9e-01	1.8e-02	2.2e-01	9.7e-01	1.3e+00	7.6e-02	3.6e-03	4.3e-02	1.9e-01	2.6e-01
Bi-207	5.5e-04	2.6e-05	3.1e-04	1.4e-03	1.9e-03	1.1e-04	5.0e-06	6.1e-05	2.7e-04	3.6e-04
Po-210	8.4e-02	3.9e-03	4.6e-02	2.1e-01	2.9e-01	1.6e-02	7.7e-04	9.2e-03	4.1e-02	5.6e-02
Ra-226	6.2e-03	2.7e-04	3.3e-03	1.6e-02	2.1e-02	1.2e-03	5.4e-05	6.6e-04	3.1e-03	4.2e-03
Ra-228	1.5e-02	6.4e-04	7.8e-03	3.7e-02	5.1e-02	2.9e-03	1.3e-04	1.5e-03	7.2e-03	1.0e-02
Ac-227	2.6e-02	1.2e-03	1.4e-02	6.7e-02	9.1e-02	5.2e-03	2.4e-04	2.8e-03	1.3e-02	1.8e-02
Th-228	2.2e-03	9.9e-05	1.2e-03	5.6e-03	7.9e-03	4.4e-04	2.0e-05	2.4e-04	1.1e-03	1.5e-03
Th-229	7.0e-03	3.0e-04	3.9e-03	1.7e-02	2.4e-02	1.4e-03	6.3e-05	7.7e-04	3.4e-03	4.8e-03
Th-230	1.9e-03	8.3e-05	1.1e-03	4.8e-03	6.6e-03	3.7e-04	1.7e-05	2.1e-04	9.4e-04	1.3e-03
Th-232	2.2e-03	9.7e-05	1.2e-03	5.5e-03	7.7e-03	4.3e-04	2.0e-05	2.4e-04	1.1e-03	1.5e-03
Pa-231	1.6e-02	7.2e-04	8.6e-03	4.0e-02	5.4e-02	3.1e-03	1.4e-04	1.7e-03	7.9e-03	1.1e-02
U-232	8.9e-04	4.1e-05	4.8e-04	2.2e-03	3.1e-03	1.8e-04	8.0e-06	9.5e-05	4.4e-04	6.1e-04
U-233	1.9e-04	8.5e-06	1.0e-04	4.7e-04	6.4e-04	3.6e-05	1.7e-06	2.0e-05	9.1e-05	1.3e-04
U-234	1.8e-04	8.3e-06	9.8e-05	4.6e-04	6.3e-04	3.6e-05	1.6e-06	2.0e-05	8.9e-05	1.2e-04
U-235	1.9e-04	8.7e-06	1.0e-04	4.8e-04	6.5e-04	3.7e-05	1.7e-06	2.0e-05	9.2e-05	1.3e-04
U-236	1.7e-04	7.9e-06	9.3e-05	4.3e-04	6.0e-04	3.4e-05	1.6e-06	1.9e-05	8.4e-05	1.2e-04
U-238	2.4e-04	1.1e-05	1.3e-04	6.1e-04	8.3e-04	4.7e-05	2.2e-06	2.6e-05	1.2e-04	1.6e-04
Np-237	2.4e-03	1.1e-04	1.3e-03	6.2e-03	8.4e-03	4.8e-04	2.2e-05	2.6e-04	1.2e-03	1.7e-03
Pu-236	1.8e-03	8.4e-05	9.9e-04	4.6e-03	6.3e-03	3.6e-04	1.7e-05	2.0e-04	9.0e-04	1.2e-03
Pu-238	5.0e-03	2.3e-04	2.7e-03	1.2e-02	1.7e-02	9.8e-04	4.6e-05	5.4e-04	2.5e-03	3.4e-03
Pu-239	5.4e-03	2.5e-04	3.0e-03	1.4e-02	1.9e-02	1.1e-03	5.0e-05	5.8e-04	2.7e-03	3.7e-03
Pu-240	5.4e-03	2.5e-04	3.0e-03	1.4e-02	1.9e-02	1.1e-03	5.0e-05	5.8e-04	2.7e-03	3.7e-03
Pu-241	1.0e-04	4.7e-06	5.6e-05	2.6e-04	3.5e-04	2.0e-05	9.5e-07	1.1e-05	5.1e-05	6.9e-05
Pu-242	5.2e-03	2.4e-04	2.8e-03	1.3e-02	1.8e-02	1.0e-03	4.8e-05	5.6e-04	2.6e-03	3.5e-03
Pu-244	5.3e-03	2.4e-04	2.8e-03	1.3e-02	1.8e-02	1.0e-03	4.9e-05	5.6e-04	2.6e-03	3.5e-03
Am-241	4.3e-03	2.0e-04	2.3e-03	1.1e-02	1.5e-02	8.5e-04	4.0e-05	4.6e-04	2.1e-03	3.0e-03
Am-242m	4.3e-03	2.0e-04	2.3e-03	1.1e-02	1.5e-02	8.5e-04	4.0e-05	4.6e-04	2.1e-03	3.0e-03
Am-243	4.3e-03	2.0e-04	2.3e-03	1.1e-02	1.5e-02	8.5e-04	4.0e-05	4.7e-04	2.1e-03	3.0e-03
Cm-242	2.3e-04	1.0e-05	1.2e-04	5.8e-04	8.0e-04	4.4e-05	2.0e-06	2.4e-05	1.1e-04	1.6e-04
Cm-243	3.3e-03	1.5e-04	1.8e-03	8.3e-03	1.1e-02	6.4e-04	2.9e-05	3.5e-04	1.6e-03	2.2e-03
Cm-244	2.6e-03	1.2e-04	1.4e-03	6.6e-03	9.2e-03	5.1e-04	2.3e-05	2.8e-04	1.3e-03	1.8e-03
Cm-245	4.6e-03	2.0e-04	2.5e-03	1.2e-02	1.6e-02	9.0e-04	4.0e-05	4.9e-04	2.3e-03	3.2e-03
Cm-246	4.6e-03	2.0e-04	2.5e-03	1.2e-02	1.6e-02	9.0e-04	4.0e-05	4.9e-04	2.3e-03	3.2e-03
Cm-247	4.1e-03	1.9e-04	2.3e-03	1.1e-02	1.5e-02	8.1e-04	3.6e-05	4.4e-04	2.1e-03	2.9e-03
Cm-248	1.7e-02	7.5e-04	9.2e-03	4.3e-02	5.9e-02	3.3e-03	1.5e-04	1.8e-03	8.5e-03	1.2e-02
Bk-249	2.1e-05	9.2e-07	1.1e-05	5.3e-05	7.3e-05	4.1e-06	1.8e-07	2.3e-06	1.0e-05	1.4e-05
Cf-248	5.7e-04	2.6e-05	3.1e-04	1.4e-03	2.0e-03	1.1e-04	5.1e-06	6.2e-05	2.9e-04	3.9e-04
Cf-249	7.6e-03	3.4e-04	4.1e-03	1.9e-02	2.6e-02	1.5e-03	6.8e-05	8.2e-04	3.8e-03	5.1e-03
Cf-250	3.5e-03	1.6e-04	1.9e-03	8.7e-03	1.2e-02	6.8e-04	3.1e-05	3.7e-04	1.7e-03	2.3e-03
Cf-251	7.8e-03	3.5e-04	4.2e-03	2.0e-02	2.7e-02	1.5e-03	7.0e-05	8.4e-04	3.9e-03	5.2e-03
Cf-252	1.9e-03	8.6e-05	1.0e-03	4.8e-03	6.5e-03	3.8e-04	1.7e-05	2.0e-04	9.5e-04	1.3e-03
Cf-254	5.7e-03	2.4e-04	3.1e-03	1.4e-02	2.0e-02	1.1e-03	4.9e-05	6.0e-04	2.8e-03	3.8e-03
Es-254	5.8e-04	2.7e-05	3.2e-04	1.5e-03	2.0e-03	1.1e-04	5.2e-06	6.3e-05	2.9e-04	4.0e-04

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.22 Normalized effective doses from all pathways: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+01	1.4e+00	6.2e+00	2.2e+01	3.3e+01	2.2e+00	2.7e-01	1.2e+00	4.3e+00	6.6e+00
P-32	1.2e-03	2.3e-07	3.5e-05	2.8e-03	5.7e-03	2.3e-04	4.5e-08	6.9e-06	5.5e-04	1.1e-03
S-35	2.3e-04	2.1e-05	1.2e-04	4.7e-04	7.4e-04	4.5e-05	4.1e-06	2.3e-05	9.4e-05	1.4e-04
Cl-36	2.0e-03	1.7e-04	1.0e-03	4.0e-03	6.3e-03	3.9e-04	3.3e-05	2.0e-04	8.0e-04	1.2e-03
K-40	9.5e-01	1.2e-01	5.4e-01	1.9e+00	2.9e+00	1.9e-01	2.4e-02	1.1e-01	3.7e-01	5.7e-01
Ca-41	4.5e-04	3.6e-05	2.3e-04	9.2e-04	1.4e-03	8.8e-05	7.3e-06	4.5e-05	1.8e-04	2.8e-04
Ca-45	1.2e-03	1.3e-04	6.4e-04	2.4e-03	3.8e-03	2.3e-04	2.6e-05	1.3e-04	4.7e-04	7.5e-04
Sc-46	8.6e+00	8.1e-01	4.4e+00	1.8e+01	2.8e+01	1.7e+00	1.6e-01	8.6e-01	3.6e+00	5.5e+00
Cr-51	1.1e-02	9.0e-05	2.1e-03	2.6e-02	4.8e-02	2.2e-03	1.8e-05	4.1e-04	5.1e-03	9.3e-03
Mn-53	4.8e-05	4.4e-06	2.5e-05	9.7e-05	1.5e-04	9.4e-06	8.9e-07	4.9e-06	1.9e-05	3.0e-05
Mn-54	8.0e+00	7.5e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.8e-01	2.4e+00	3.6e+00
Fe-55	1.4e-05	9.2e-07	6.8e-06	2.8e-05	4.4e-05	2.7e-06	1.9e-07	1.3e-06	5.5e-06	8.8e-06
Fe-59	7.6e-02	2.7e-03	2.7e-02	1.8e-01	2.9e-01	1.5e-02	5.2e-04	5.4e-03	3.6e-02	5.7e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.5e+00	1.1e-01	7.0e-01	3.3e+00	5.1e+00	2.9e-01	2.2e-02	1.4e-01	6.4e-01	1.0e+00
Sr-89	6.8e-03	3.7e-04	2.8e-03	1.6e-02	2.5e-02	1.3e-03	7.5e-05	5.6e-04	3.1e-03	4.8e-03
Sr-90	1.2e-01	1.5e-02	8.4e-02	2.3e-01	3.5e-01	2.3e-02	2.9e-03	1.3e-02	4.5e-02	7.0e-02
Y-91	2.1e-02	1.4e-03	9.4e-03	4.6e-02	7.3e-02	4.1e-03	2.8e-04	1.9e-03	9.1e-03	1.4e-02
Zr-93	2.9e-03	3.6e-04	1.6e-03	5.8e-03	8.8e-03	5.7e-04	7.0e-05	3.2e-04	1.2e-03	1.7e-03
Zr-95	5.0e+00	5.0e-01	2.6e+00	1.0e+01	1.6e+01	9.8e-01	1.0e-01	5.2e-01	2.1e+00	3.1e+00
Nb-93m	5.1e-04	6.3e-05	2.8e-04	1.0e-03	1.5e-03	1.0e-04	1.2e-05	5.6e-05	2.0e-04	3.0e-04
Nb-94	1.6e+01	2.1e+00	9.2e+00	3.2e+01	4.8e+01	3.2e+00	4.1e-01	1.8e+00	6.3e+00	9.7e+00
Nb-95	1.3e+00	3.2e-02	3.8e-01	3.0e+00	5.2e+00	2.5e-01	6.3e-03	7.7e-02	6.0e-01	1.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.8e-01	8.5e-03	7.3e-02	4.2e-01	6.8e-01	3.6e-02	1.7e-03	1.5e-02	8.4e-02	1.4e-01
Sb-125	1.1e-01	6.9e-03	5.7e-02	2.4e-01	3.6e-01	2.2e-02	1.6e-03	1.1e-02	4.7e-02	7.1e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	2.0e-03	7.6e-05	7.7e-04	4.5e-03	7.6e-03	4.0e-04	1.5e-05	1.5e-04	8.9e-04	1.5e-03
I-129	4.1e-02	2.2e-03	1.8e-02	8.9e-02	1.4e-01	8.1e-03	4.4e-04	3.7e-03	1.8e-02	2.8e-02
I-131	1.3e-02	1.4e-09	9.0e-08	1.9e-02	5.8e-02	2.5e-03	2.8e-10	1.8e-08	3.9e-03	1.1e-02
Cs-134	3.5e-01	3.2e-02	1.8e-01	7.2e-01	1.1e+00	6.8e-02	6.3e-03	3.5e-02	1.4e-01	2.2e-01
Cs-135	7.9e-05	4.8e-06	3.7e-05	1.6e-04	2.6e-04	1.5e-05	9.5e-07	7.3e-06	3.2e-05	5.1e-05
Cs-137	1.4e-01	1.3e-02	7.1e-02	2.9e-01	4.4e-01	2.7e-02	2.5e-03	1.4e-02	5.7e-02	8.7e-02
Ba-133	2.9e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Ce-139	4.1e-01	4.9e-02	2.3e-01	8.5e-01	1.3e+00	8.1e-02	9.7e-03	4.5e-02	1.7e-01	2.5e-01
Ce-141	5.2e-02	1.1e-03	1.4e-02	1.3e-01	2.2e-01	1.0e-02	2.1e-04	2.9e-03	2.5e-02	4.2e-02
Ce-144	3.6e-01	4.7e-02	2.1e-01	7.3e-01	1.1e+00	7.2e-02	9.3e-03	4.1e-02	1.4e-01	2.2e-01
Pm-147	1.5e-03	1.9e-04	8.3e-04	3.0e-03	4.5e-03	3.0e-04	3.7e-05	1.6e-04	5.8e-04	8.9e-04

Table F2.22 Normalized effective doses from all pathways: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.1e-03	1.4e-04	6.2e-04	2.3e-03	3.4e-03	2.2e-04	2.7e-05	1.2e-04	4.5e-04	6.8e-04
Eu-152	1.2e+01	1.5e+00	6.6e+00	2.3e+01	3.5e+01	2.3e+00	3.0e-01	1.3e+00	4.6e+00	7.1e+00
Eu-154	1.1e+01	1.5e+00	6.4e+00	2.2e+01	3.4e+01	2.2e+00	2.9e-01	1.3e+00	4.4e+00	6.8e+00
Eu-155	1.4e-01	1.8e-02	7.9e-02	2.7e-01	4.1e-01	2.7e-02	3.6e-03	1.6e-02	5.4e-02	8.4e-02
Gd-153	1.3e-01	1.6e-02	7.4e-02	2.6e-01	3.9e-01	2.6e-02	3.3e-03	1.5e-02	5.1e-02	7.8e-02
Tb-160	4.1e+00	3.4e-01	2.0e+00	6.9e+00	1.4e+01	8.0e-01	6.9e-02	4.0e-01	1.7e+00	2.7e+00
Tm-170	8.3e-03	9.8e-04	4.5e-03	1.7e-02	2.6e-02	1.6e-03	1.9e-04	9.0e-04	3.3e-03	5.1e-03
Tm-171	9.2e-04	1.2e-04	5.3e-04	1.8e-03	2.8e-03	1.8e-04	2.4e-05	1.0e-04	3.6e-04	5.5e-04
Ta-182	6.6e+00	7.4e-01	3.6e+00	1.4e+01	2.1e+01	1.3e+00	1.5e-01	7.1e-01	2.7e+00	4.1e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.0e+01	2.6e+00	1.1e+01	3.9e+01	5.9e+01	3.9e+00	5.0e-01	2.2e+00	7.6e+00	1.2e+01
Ra-228	1.3e+01	1.7e+00	7.6e+00	2.7e+01	4.0e+01	2.6e+00	3.4e-01	1.5e+00	5.2e+00	8.1e+00
Ac-227	2.8e+01	3.5e+00	1.5e+01	5.5e+01	8.4e+01	5.4e+00	6.8e-01	3.0e+00	1.1e+01	1.6e+01
Th-228	2.6e+01	3.4e+00	1.5e+01	5.1e+01	7.8e+01	5.1e+00	6.8e-01	2.9e+00	1.0e+01	1.6e+01
Th-229	2.6e+01	3.2e+00	1.4e+01	5.1e+01	7.7e+01	5.0e+00	6.3e-01	2.8e+00	1.0e+01	1.5e+01
Th-230	2.9e+00	3.6e-01	1.6e+00	5.8e+00	8.8e+00	5.7e-01	7.0e-02	3.2e-01	1.1e+00	1.7e+00
Th-232	5.3e+00	6.6e-01	2.9e+00	1.1e+01	1.6e+01	1.0e+00	1.3e-01	5.7e-01	2.1e+00	3.2e+00
Pa-231	8.0e+00	1.0e+00	4.4e+00	1.6e+01	2.4e+01	1.6e+00	2.0e-01	8.8e-01	3.2e+00	4.8e+00
U-232	1.4e+01	1.7e+00	7.4e+00	2.7e+01	4.1e+01	2.7e+00	3.2e-01	1.5e+00	5.3e+00	8.1e+00
U-233	2.7e+00	3.3e-01	1.5e+00	5.3e+00	8.1e+00	5.3e-01	6.4e-02	2.9e-01	1.1e+00	1.6e+00
U-234	2.6e+00	3.2e-01	1.4e+00	5.3e+00	8.0e+00	5.2e-01	6.3e-02	2.9e-01	1.0e+00	1.6e+00
U-235	3.3e+00	4.3e-01	1.9e+00	6.6e+00	1.0e+01	6.6e-01	8.4e-02	3.7e-01	1.3e+00	2.0e+00
U-236	2.4e+00	3.0e-01	1.3e+00	4.9e+00	7.4e+00	4.8e-01	5.8e-02	2.6e-01	9.6e-01	1.5e+00
U-238	2.5e+00	3.1e-01	1.4e+00	4.9e+00	7.5e+00	4.8e-01	6.0e-02	2.7e-01	9.7e-01	1.5e+00
Np-237	7.6e+00	9.7e-01	4.2e+00	1.5e+01	2.3e+01	1.5e+00	1.9e-01	8.4e-01	3.0e+00	4.5e+00
Pu-236	2.8e+00	3.4e-01	1.5e+00	5.5e+00	8.4e+00	5.4e-01	6.7e-02	3.0e-01	1.1e+00	1.7e+00
Pu-238	4.5e+00	5.6e-01	2.5e+00	9.1e+00	1.4e+01	8.9e-01	1.1e-01	5.0e-01	1.8e+00	2.7e+00
Pu-239	3.5e+00	4.4e-01	1.9e+00	7.1e+00	1.1e+01	6.9e-01	8.5e-02	3.8e-01	1.4e+00	2.1e+00
Pu-240	3.5e+00	4.4e-01	1.9e+00	7.1e+00	1.1e+01	6.9e-01	8.5e-02	3.8e-01	1.4e+00	2.1e+00
Pu-241	4.4e-02	5.4e-03	2.4e-02	8.8e-02	1.3e-01	8.6e-03	1.1e-03	4.8e-03	1.7e-02	2.6e-02
Pu-242	3.3e+00	4.1e-01	1.8e+00	6.6e+00	9.9e+00	6.5e-01	7.9e-02	3.6e-01	1.3e+00	2.0e+00
Pu-244	6.4e+00	8.3e-01	3.6e+00	1.3e+01	1.9e+01	1.3e+00	1.7e-01	7.2e-01	2.5e+00	3.8e+00
Am-241	1.1e+01	1.3e+00	5.9e+00	2.2e+01	3.2e+01	2.1e+00	2.6e-01	1.2e+00	4.2e+00	6.5e+00
Am-242m	1.1e+01	1.3e+00	5.9e+00	2.2e+01	3.3e+01	2.1e+00	2.6e-01	1.2e+00	4.2e+00	6.5e+00
Am-243	1.2e+01	1.5e+00	6.5e+00	2.4e+01	3.6e+01	2.3e+00	2.9e-01	1.3e+00	4.6e+00	7.0e+00
Cm-242	8.7e-01	1.0e-01	4.8e-01	1.8e+00	2.7e+00	1.7e-01	2.0e-02	9.5e-02	3.5e-01	5.2e-01
Cm-243	8.6e+00	1.1e+00	4.7e+00	1.7e+01	2.6e+01	1.7e+00	2.1e-01	9.4e-01	3.4e+00	5.2e+00
Cm-244	6.6e+00	8.2e-01	3.6e+00	1.3e+01	2.0e+01	1.3e+00	1.6e-01	7.2e-01	2.6e+00	4.0e+00
Cm-245	1.1e+01	1.4e+00	6.1e+00	2.2e+01	3.4e+01	2.2e+00	2.7e-01	1.2e+00	4.4e+00	6.6e+00
Cm-246	1.1e+01	1.3e+00	5.8e+00	2.1e+01	3.3e+01	2.1e+00	2.6e-01	1.2e+00	4.2e+00	6.4e+00
Cm-247	1.3e+01	1.6e+00	7.1e+00	2.5e+01	3.8e+01	2.5e+00	3.2e-01	1.4e+00	5.0e+00	7.6e+00
Cm-248	3.8e+01	4.6e+00	2.1e+01	7.6e+01	1.1e+02	7.4e+00	9.1e-01	4.1e+00	1.5e+01	2.3e+01
Bk-249	4.3e-02	5.3e-03	2.3e-02	8.5e-02	1.3e-01	8.4e-03	1.0e-03	4.6e-03	1.7e-02	2.6e-02
Cf-248	1.9e+00	2.3e-01	1.1e+00	3.8e+00	5.8e+00	3.8e-01	4.6e-02	2.1e-01	7.5e-01	1.2e+00
Cf-249	2.1e+01	2.6e+00	1.1e+01	4.1e+01	6.3e+01	4.1e+00	5.1e-01	2.3e+00	8.1e+00	1.2e+01
Cf-250	8.5e+00	1.1e+00	4.7e+00	1.7e+01	2.6e+01	1.7e+00	2.1e-01	9.3e-01	3.4e+00	5.1e+00
Cf-251	1.9e+01	2.3e+00	1.0e+01	3.8e+01	5.7e+01	3.7e+00	4.6e-01	2.1e+00	7.4e+00	1.1e+01
Cf-252	4.7e+00	5.8e-01	2.6e+00	9.3e+00	1.4e+01	9.2e-01	1.1e-01	5.1e-01	1.9e+00	2.8e+00
Cf-254	5.8e+01	4.1e+00	2.7e+01	1.3e+02	2.1e+02	1.1e+01	8.2e-01	5.3e+00	2.5e+01	4.0e+01
Es-254	8.9e+00	1.1e+00	5.0e+00	1.8e+01	2.7e+01	1.7e+00	2.3e-01	1.0e+00	3.5e+00	5.3e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.23 Normalized effective doses from external exposure: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e+01	1.4e+00	6.2e+00	2.2e+01	3.3e+01	2.2e+00	2.7e-01	1.2e+00	4.3e+00	6.6e+00
P-32	1.0e-03	2.0e-07	3.1e-05	2.5e-03	5.2e-03	2.0e-04	4.1e-08	6.2e-06	4.8e-04	1.0e-03
S-35	5.9e-06	5.7e-07	3.0e-06	1.2e-05	1.9e-05	1.2e-06	1.1e-07	6.0e-07	2.5e-06	3.8e-06
Cl-36	1.2e-03	9.9e-05	5.9e-04	2.4e-03	3.7e-03	2.3e-04	2.0e-05	1.2e-04	4.8e-04	7.4e-04
K-40	9.5e-01	1.2e-01	5.3e-01	1.9e+00	2.9e+00	1.9e-01	2.4e-02	1.1e-01	3.7e-01	5.7e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	6.7e-05	8.2e-06	3.7e-05	1.4e-04	2.1e-04	1.3e-05	1.6e-06	7.3e-06	2.7e-05	4.1e-05
Sc-46	8.6e+00	8.1e-01	4.4e+00	1.8e+01	2.8e+01	1.7e+00	1.6e-01	8.5e-01	3.6e+00	5.5e+00
Cr-51	1.1e-02	9.0e-05	2.1e-03	2.6e-02	4.8e-02	2.2e-03	1.8e-05	4.1e-04	5.1e-03	9.3e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	6.0e+00	7.5e-01	3.4e+00	1.2e+01	1.8e+01	1.2e+00	1.5e-01	6.7e-01	2.4e+00	3.6e+00
Fe-55	1.7e-11	1.6e-12	9.2e-12	3.4e-11	5.3e-11	3.3e-12	3.2e-13	1.8e-12	6.7e-12	1.0e-11
Fe-59	7.6e-02	2.7e-03	2.7e-02	1.8e-01	2.9e-01	1.5e-02	5.2e-04	5.4e-03	3.6e-02	5.7e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.5e+00	1.1e-01	7.0e-01	3.3e+00	5.1e+00	2.9e-01	2.2e-02	1.4e-01	6.4e-01	1.0e+00
Sr-89	5.8e-03	3.2e-04	2.4e-03	1.3e-02	2.1e-02	1.1e-03	6.3e-05	4.8e-04	2.6e-03	4.2e-03
Sr-90	8.4e-02	8.2e-03	3.6e-02	1.3e-01	1.9e-01	1.3e-02	1.6e-03	7.2e-03	2.5e-02	3.9e-02
Y-91	1.9e-02	1.3e-03	8.7e-03	4.3e-02	6.8e-02	3.7e-03	2.5e-04	1.7e-03	8.4e-03	1.3e-02
Zr-93	6.2e-07	6.2e-08	3.2e-07	1.3e-06	2.0e-06	1.2e-07	1.2e-08	6.4e-08	2.5e-07	3.9e-07
Zr-95	5.0e+00	5.0e-01	2.6e+00	1.0e+01	1.6e+01	9.8e-01	1.0e-01	5.2e-01	2.1e+00	3.1e+00
Nb-93m	3.0e-05	3.9e-06	1.7e-05	6.0e-05	8.9e-05	5.9e-06	7.6e-07	3.4e-06	1.2e-05	1.8e-05
Nb-94	1.6e+01	2.1e+00	9.2e+00	3.2e+01	4.8e+01	3.2e+00	4.1e-01	1.8e+00	6.3e+00	9.7e+00
Nb-95	1.3e+00	3.2e-02	3.8e-01	3.0e+00	5.2e+00	2.5e-01	6.3e-03	7.7e-02	6.0e-01	1.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.8e-01	8.5e-03	7.3e-02	4.2e-01	6.8e-01	3.6e-02	1.7e-03	1.5e-02	8.4e-02	1.4e-01
Sb-125	1.1e-01	8.9e-03	5.7e-02	2.4e-01	3.6e-01	2.2e-02	1.8e-03	1.1e-02	4.7e-02	7.1e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	4.0e-04	1.9e-05	1.6e-04	8.9e-04	1.5e-03	7.9e-05	3.8e-06	3.2e-05	1.8e-04	2.9e-04
I-129	1.1e-03	9.7e-05	5.7e-04	2.3e-03	3.6e-03	2.2e-04	1.9e-05	1.1e-04	4.7e-04	7.0e-04
I-131	1.3e-02	1.4e-09	8.9e-06	1.9e-02	5.8e-02	2.5e-03	2.7e-10	1.7e-06	3.9e-03	1.1e-02
Cs-134	3.5e-01	3.2e-02	1.8e-01	7.2e-01	1.1e+00	6.8e-02	6.3e-03	3.5e-02	1.4e-01	2.2e-01
Cs-135	4.5e-06	4.1e-07	2.3e-06	9.4e-06	1.4e-05	8.9e-07	8.2e-08	4.5e-07	1.8e-06	2.8e-06
Cs-137	1.4e-01	1.3e-02	7.1e-02	2.9e-01	4.4e-01	2.7e-02	2.5e-03	1.4e-02	5.6e-02	8.7e-02
Ba-133	2.9e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Ce-139	4.1e-01	4.9e-02	2.3e-01	8.5e-01	1.3e+00	8.1e-02	9.7e-03	4.5e-02	1.7e-01	2.5e-01
Ce-141	5.2e-02	1.0e-03	1.4e-02	1.3e-01	2.2e-01	1.0e-02	2.1e-04	2.8e-03	2.5e-02	4.2e-02
Ce-144	3.5e-01	4.4e-02	2.0e-01	7.0e-01	1.1e+00	6.9e-02	8.9e-03	3.9e-02	1.4e-01	2.1e-01
Pm-147	8.7e-05	8.6e-06	3.8e-05	1.3e-04	2.0e-04	1.3e-05	1.7e-06	7.6e-06	2.6e-05	4.1e-05

Table F2.23 Normalized effective doses from external exposure: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.1e-07	1.0e-07	4.6e-07	1.6e-06	2.4e-06	1.6e-07	2.1e-08	9.1e-08	3.2e-07	4.9e-07
Eu-152	1.2e+01	1.5e+00	6.6e+00	2.3e+01	3.5e+01	2.3e+00	3.0e-01	1.3e+00	4.6e+00	7.1e+00
Eu-154	1.1e+01	1.5e+00	6.4e+00	2.2e+01	3.4e+01	2.2e+00	2.9e-01	1.3e+00	4.4e+00	6.8e+00
Eu-155	1.4e-01	1.8e-02	7.8e-02	2.7e-01	4.1e-01	2.7e-02	3.5e-03	1.5e-02	5.3e-02	8.3e-02
Gd-153	1.3e-01	1.6e-02	7.3e-02	2.6e-01	3.9e-01	2.6e-02	3.3e-03	1.4e-02	5.1e-02	7.7e-02
Tb-160	4.1e+00	3.4e-01	2.0e+00	8.9e+00	1.4e+01	8.0e-01	6.9e-02	4.0e-01	1.7e+00	2.7e+00
Tm-170	6.3e-03	7.3e-04	3.4e-03	1.3e-02	2.0e-02	1.2e-03	1.5e-04	6.8e-04	2.6e-03	3.9e-03
Tm-171	4.9e-04	6.2e-05	2.8e-04	9.6e-04	1.5e-03	9.6e-05	1.2e-05	5.5e-05	1.9e-04	3.0e-04
Ta-182	6.6e+00	7.4e-01	3.6e+00	1.4e+01	2.1e+01	1.3e+00	1.5e-01	7.1e-01	2.7e+00	4.1e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.8e+01	2.4e+00	1.0e+01	3.7e+01	5.5e+01	3.6e+00	4.7e-01	2.1e+00	7.2e+00	1.1e+01
Ra-228	1.0e+01	1.3e+00	5.9e+00	2.1e+01	3.2e+01	2.1e+00	2.6e-01	1.2e+00	4.1e+00	6.3e+00
Ac-227	3.1e+00	4.0e-01	1.7e+00	6.1e+00	9.1e+00	6.0e-01	7.8e-02	3.4e-01	1.2e+00	1.8e+00
Th-228	1.4e+01	1.8e+00	8.1e+00	2.8e+01	4.2e+01	2.8e+00	3.6e-01	1.6e+00	5.5e+00	8.6e+00
Th-229	2.2e+00	2.8e-01	1.3e+00	4.4e+00	6.6e+00	4.4e-01	5.6e-02	2.5e-01	8.6e-01	1.3e+00
Th-230	3.9e-03	3.8e-04	2.0e-03	8.1e-03	1.2e-02	7.7e-04	7.5e-05	4.0e-04	1.6e-03	2.4e-03
Th-232	4.2e-01	2.4e-02	2.0e-01	8.9e-01	1.4e+00	8.3e-02	4.9e-03	3.9e-02	1.8e-01	2.8e-01
Pa-231	2.9e-01	3.7e-02	1.6e-01	5.7e-01	8.7e-01	5.6e-02	7.2e-03	3.2e-02	1.1e-01	1.7e-01
U-232	1.9e+00	1.2e-01	9.3e-01	4.0e+00	6.2e+00	3.7e-01	2.5e-02	1.8e-01	7.8e-01	1.2e+00
U-233	1.3e-03	1.6e-04	7.1e-04	2.5e-03	3.8e-03	2.5e-04	3.2e-05	1.4e-04	4.9e-04	7.5e-04
U-234	2.9e-04	3.8e-05	1.7e-04	5.8e-04	8.8e-04	5.8e-05	7.5e-06	3.3e-05	1.2e-04	1.8e-04
U-235	9.8e-01	1.3e-01	5.5e-01	1.9e+00	2.9e+00	1.9e-01	2.5e-02	1.1e-01	3.8e-01	5.9e-01
U-236	1.3e-04	1.7e-05	7.5e-05	2.6e-04	3.9e-04	2.6e-05	3.4e-06	1.5e-05	5.2e-05	8.0e-05
U-238	2.5e-01	3.2e-02	1.4e-01	4.9e-01	7.3e-01	4.9e-02	6.3e-03	2.8e-02	9.6e-02	1.5e-01
Np-237	1.6e+00	2.1e-01	9.3e-01	3.2e+00	4.8e+00	3.2e-01	4.2e-02	1.8e-01	6.3e-01	9.8e-01
Pu-236	4.2e-03	9.9e-05	1.6e-03	9.4e-03	1.5e-02	8.3e-04	2.0e-05	3.2e-04	1.8e-03	3.0e-03
Pu-238	6.8e-05	8.8e-06	3.9e-05	1.3e-04	2.0e-04	1.3e-05	1.7e-06	7.7e-06	2.7e-05	4.1e-05
Pu-239	3.4e-04	4.4e-05	2.0e-04	6.8e-04	1.0e-03	6.8e-05	8.8e-06	3.9e-05	1.3e-04	2.1e-04
Pu-240	6.5e-05	8.4e-06	3.7e-05	1.3e-04	1.9e-04	1.3e-05	1.7e-06	7.3e-06	2.5e-05	3.9e-05
Pu-241	1.8e-05	1.8e-06	9.5e-06	3.8e-05	5.8e-05	3.6e-06	3.5e-07	1.9e-06	7.4e-06	1.1e-05
Pu-242	6.0e-05	7.7e-06	3.4e-05	1.2e-04	1.8e-04	1.2e-05	1.5e-06	6.7e-06	2.3e-05	3.6e-05
Pu-244	3.2e+00	4.2e-01	1.8e+00	6.4e+00	9.7e+00	6.4e-01	8.3e-02	3.6e-01	1.3e+00	1.9e+00
Am-241	2.4e-02	3.0e-03	1.3e-02	4.6e-02	7.0e-02	4.6e-03	6.0e-04	2.7e-03	9.2e-03	1.4e-02
Am-242m	7.6e-02	9.8e-03	4.3e-02	1.5e-01	2.3e-01	1.5e-02	1.9e-03	8.6e-03	3.0e-02	4.6e-02
Am-243	1.1e+00	1.4e-01	6.0e-01	2.1e+00	3.1e+00	2.1e-01	2.7e-02	1.2e-01	4.1e-01	6.3e-01
Cm-242	4.6e-05	5.6e-06	2.6e-05	9.3e-05	1.4e-04	9.1e-06	1.1e-06	5.1e-06	1.8e-05	2.8e-05
Cm-243	7.2e-01	9.2e-02	4.1e-01	1.4e+00	2.1e+00	1.4e-01	1.8e-02	8.0e-02	2.8e-01	4.3e-01
Cm-244	6.4e-05	8.2e-06	3.6e-05	1.3e-04	1.9e-04	1.2e-05	1.6e-06	7.1e-06	2.5e-05	3.8e-05
Cm-245	3.7e-01	4.8e-02	2.1e-01	7.3e-01	1.1e+00	7.3e-02	9.4e-03	4.2e-02	1.4e-01	2.2e-01
Cm-246	2.9e-05	3.7e-06	1.6e-05	5.7e-05	8.6e-05	5.7e-06	7.5e-07	3.2e-06	1.1e-05	1.7e-05
Cm-247	2.8e+00	3.7e-01	1.6e+00	5.6e+00	8.5e+00	5.6e-01	7.3e-02	3.2e-01	1.1e+00	1.7e+00
Cm-248	2.6e-05	3.4e-06	1.5e-05	5.2e-05	7.9e-05	5.2e-06	6.7e-07	3.0e-06	1.0e-05	1.6e-05
Bk-249	1.7e-03	1.2e-04	8.3e-04	3.5e-03	5.4e-03	3.3e-04	2.3e-05	1.6e-04	6.9e-04	1.1e-03
Cf-248	7.6e-05	9.7e-06	4.3e-05	1.5e-04	2.3e-04	1.5e-05	1.9e-06	8.6e-06	3.0e-05	4.5e-05
Cf-249	2.8e+00	3.6e-01	1.6e+00	5.6e+00	8.3e+00	5.5e-01	7.2e-02	3.2e-01	1.1e+00	1.7e+00
Cf-250	3.2e-05	4.1e-06	1.8e-05	6.3e-05	9.4e-05	6.2e-06	8.1e-07	3.6e-06	1.2e-05	1.9e-05
Cf-251	5.7e-01	7.4e-02	3.2e-01	1.1e+00	1.7e+00	1.1e-01	1.5e-02	6.4e-02	2.2e-01	3.4e-01
Cf-252	8.2e-05	1.1e-05	4.7e-05	1.6e-04	2.4e-04	1.6e-05	2.1e-06	9.2e-06	3.2e-05	5.0e-05
Cf-254	5.5e+01	3.8e+00	2.6e+01	1.2e+02	2.0e+02	1.1e+01	7.8e-01	5.0e+00	2.4e+01	3.9e+01
Es-254	7.0e+00	8.9e-01	4.0e+00	1.4e+01	2.1e+01	1.4e+00	1.8e-01	7.9e-01	2.8e+00	4.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.24 Normalized effective doses from inhalation: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.7e-04	4.5e-05	2.0e-04	7.3e-04	1.1e-03	7.3e-05	8.9e-06	4.0e-05	1.4e-04	2.2e-04
P-32	1.4e-05	2.6e-09	4.5e-07	3.4e-05	8.9e-05	2.8e-06	5.3e-10	8.8e-08	7.0e-06	1.4e-05
S-35	1.5e-04	1.4e-05	7.9e-05	3.2e-04	5.0e-04	3.0e-05	2.8e-06	1.6e-05	6.4e-05	9.8e-05
Cl-36	5.0e-04	4.0e-05	2.4e-04	1.0e-03	1.6e-03	9.7e-05	7.8e-06	4.7e-05	2.0e-04	3.1e-04
K-40	8.1e-04	7.3e-05	3.3e-04	1.2e-03	1.9e-03	1.2e-04	1.4e-05	6.6e-05	2.4e-04	3.7e-04
Ca-41	7.3e-05	8.9e-06	4.0e-05	1.5e-04	2.2e-04	1.4e-05	1.8e-06	7.9e-06	2.9e-05	4.4e-05
Ca-45	5.3e-04	8.1e-05	2.9e-04	1.1e-03	1.6e-03	1.0e-04	1.2e-05	5.7e-05	2.1e-04	3.2e-04
Sc-46	7.3e-04	6.6e-05	3.7e-04	1.5e-03	2.4e-03	1.4e-04	1.3e-05	7.3e-05	3.0e-04	4.7e-04
Cr-51	5.7e-07	4.4e-09	1.1e-07	1.4e-06	2.4e-06	1.1e-07	8.8e-10	2.1e-08	2.7e-07	4.7e-07
Mn-53	1.3e-05	1.5e-06	6.9e-06	2.5e-05	3.9e-05	2.5e-06	3.0e-07	1.4e-06	5.0e-06	7.6e-06
Mn-54	3.2e-04	3.7e-05	1.8e-04	6.5e-04	9.9e-04	6.3e-05	7.4e-06	3.5e-05	1.3e-04	1.9e-04
Fe-55	3.1e-06	2.8e-07	1.7e-06	8.4e-06	9.8e-06	6.2e-07	5.6e-08	3.3e-07	1.3e-06	2.0e-06
Fe-59	7.1e-06	2.3e-07	2.5e-06	1.6e-05	2.7e-05	1.4e-06	4.6e-08	5.0e-07	3.2e-06	5.3e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.8e-05	4.9e-06	3.2e-05	1.5e-04	2.3e-04	1.3e-05	1.0e-06	6.4e-06	2.9e-05	4.6e-05
Sr-89	1.3e-04	8.9e-06	5.5e-05	3.0e-04	4.8e-04	2.6e-05	1.4e-06	1.1e-05	5.9e-05	9.3e-05
Sr-90	1.2e-02	1.5e-03	6.6e-03	2.4e-02	3.6e-02	2.4e-03	2.9e-04	1.3e-03	4.8e-03	7.3e-03
Y-91	6.7e-04	4.3e-05	3.0e-04	1.5e-03	2.3e-03	1.3e-04	8.7e-06	6.0e-05	2.9e-04	4.6e-04
Zr-93	2.6e-03	3.1e-04	1.4e-03	5.1e-03	7.7e-03	5.0e-04	6.1e-05	2.8e-04	1.0e-03	1.5e-03
Zr-95	6.0e-04	5.0e-05	3.0e-04	1.3e-03	2.0e-03	1.2e-04	1.0e-05	6.0e-05	2.5e-04	3.9e-04
Nb-93m	3.3e-04	4.0e-05	1.8e-04	6.5e-04	9.9e-04	6.4e-05	7.9e-06	3.5e-05	1.3e-04	2.0e-04
Nb-94	9.7e-03	1.2e-03	5.3e-03	1.9e-02	2.9e-02	1.9e-03	2.3e-04	1.0e-03	3.8e-03	5.8e-03
Nb-95	8.0e-05	1.9e-06	2.4e-05	2.0e-04	3.2e-04	1.6e-05	3.8e-07	4.7e-06	3.9e-05	6.4e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.6e-05	7.3e-07	6.5e-06	3.8e-05	6.1e-05	3.2e-06	1.4e-07	1.3e-06	7.4e-06	1.2e-05
Sb-125	4.3e-05	3.3e-06	2.1e-05	9.1e-05	1.4e-04	8.4e-06	6.5e-07	4.2e-06	1.8e-05	2.8e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	2.1e-04	9.3e-06	8.3e-05	4.5e-04	7.7e-04	4.1e-05	1.9e-06	1.6e-05	8.9e-05	1.5e-04
I-129	4.9e-03	3.8e-04	2.4e-03	1.0e-02	1.6e-02	9.6e-04	7.6e-05	4.8e-04	2.0e-03	3.1e-03
I-131	1.6e-05	1.7e-12	1.1e-08	2.4e-05	7.2e-05	3.1e-06	3.4e-13	2.1e-09	4.8e-06	1.4e-05
Cs-134	8.2e-05	7.1e-06	4.1e-05	1.7e-04	2.7e-04	1.6e-05	1.4e-06	8.1e-06	3.3e-05	5.3e-05
Cs-135	9.5e-06	8.2e-07	4.8e-06	1.9e-05	3.0e-05	1.9e-06	1.6e-07	9.4e-07	3.8e-06	6.1e-06
Cs-137	8.4e-05	5.5e-06	3.2e-05	1.3e-04	2.0e-04	1.3e-05	1.1e-06	6.3e-06	2.5e-05	4.1e-05
Ba-133	8.8e-04	8.3e-05	3.7e-04	1.4e-03	2.1e-03	1.3e-04	1.6e-05	7.4e-05	2.7e-04	4.1e-04
Ce-139	3.0e-04	3.3e-05	1.6e-04	6.0e-04	9.1e-04	5.8e-05	6.5e-06	3.2e-05	1.2e-04	1.8e-04
Ce-141	1.7e-04	3.3e-06	4.7e-05	4.3e-04	7.1e-04	3.4e-05	6.6e-07	9.4e-06	8.5e-05	1.4e-04
Ce-144	8.3e-03	9.8e-04	4.6e-03	1.7e-02	2.5e-02	1.6e-03	2.0e-04	9.1e-04	3.2e-03	4.9e-03
Pm-147	1.1e-03	1.4e-04	6.2e-04	2.2e-03	3.4e-03	2.2e-04	2.7e-05	1.2e-04	4.5e-04	6.8e-04

Table F2.24 Normalized effective doses from inhalation: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.0e-03	1.2e-04	5.5e-04	2.0e-03	3.1e-03	2.0e-04	2.4e-05	1.1e-04	3.9e-04	6.1e-04
Eu-152	1.0e-02	1.3e-03	5.6e-03	2.0e-02	3.1e-02	2.0e-03	2.4e-04	1.1e-03	4.0e-03	6.2e-03
Eu-154	1.3e-02	1.6e-03	7.2e-03	2.6e-02	4.0e-02	2.6e-03	3.1e-04	1.4e-03	5.2e-03	7.9e-03
Eu-155	1.7e-03	2.1e-04	9.5e-04	3.4e-03	5.2e-03	3.4e-04	4.1e-05	1.9e-04	6.8e-04	1.0e-03
Gd-153	3.8e-04	4.5e-05	2.1e-04	7.6e-04	1.2e-03	7.5e-05	8.9e-06	4.1e-05	1.5e-04	2.3e-04
Tb-160	7.3e-04	5.8e-05	3.5e-04	1.6e-03	2.4e-03	1.4e-04	1.2e-05	7.0e-05	3.1e-04	4.7e-04
Tm-170	1.1e-03	1.2e-04	5.7e-04	2.2e-03	3.3e-03	2.1e-04	2.3e-05	1.1e-04	4.3e-04	6.5e-04
Tm-171	3.1e-04	3.8e-05	1.7e-04	6.2e-04	9.4e-04	6.1e-05	7.4e-06	3.4e-05	1.2e-04	1.9e-04
Ta-182	1.4e-03	1.5e-04	7.5e-04	2.9e-03	4.4e-03	2.8e-04	2.9e-05	1.5e-04	5.7e-04	8.6e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Re-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	8.8e-01	1.1e-01	4.8e-01	1.8e+00	2.7e+00	1.7e-01	2.1e-02	9.5e-02	3.4e-01	5.3e-01
Ra-228	2.2e+00	2.1e-01	1.1e+00	4.5e+00	6.9e+00	4.3e-01	4.2e-02	2.2e-01	8.9e-01	1.4e+00
Ac-227	2.3e+01	2.8e+00	1.3e+01	4.6e+01	7.0e+01	4.5e+00	5.5e-01	2.5e+00	9.1e+00	1.4e+01
Th-228	1.2e+01	1.4e+00	6.5e+00	2.3e+01	3.6e+01	2.3e+00	2.8e-01	1.3e+00	4.6e+00	7.1e+00
Th-229	2.3e+01	2.8e+00	1.3e+01	4.6e+01	7.0e+01	4.5e+00	5.5e-01	2.5e+00	9.0e+00	1.4e+01
Th-230	2.8e+00	3.4e-01	1.5e+00	5.6e+00	8.5e+00	5.5e-01	6.7e-02	3.0e-01	1.1e+00	1.7e+00
Th-232	4.7e+00	5.7e-01	2.6e+00	9.4e+00	1.4e+01	9.2e-01	1.1e-01	5.1e-01	1.8e+00	2.8e+00
Pa-231	6.8e+00	8.3e-01	3.7e+00	1.4e+01	2.1e+01	1.3e+00	1.6e-01	7.4e-01	2.7e+00	4.1e+00
U-232	1.2e+01	1.4e+00	6.2e+00	2.3e+01	3.6e+01	2.3e+00	2.7e-01	1.2e+00	4.5e+00	6.9e+00
U-233	2.7e+00	3.3e-01	1.5e+00	5.3e+00	8.1e+00	5.2e-01	6.3e-02	2.9e-01	1.0e+00	1.6e+00
U-234	2.6e+00	3.2e-01	1.4e+00	5.2e+00	7.9e+00	5.2e-01	6.3e-02	2.8e-01	1.0e+00	1.6e+00
U-235	2.4e+00	2.9e-01	1.3e+00	4.7e+00	7.1e+00	4.6e-01	5.6e-02	2.5e-01	9.2e-01	1.4e+00
U-236	2.4e+00	3.0e-01	1.3e+00	4.9e+00	7.4e+00	4.8e-01	5.8e-02	2.6e-01	9.5e-01	1.5e+00
U-238	2.2e+00	2.7e-01	1.2e+00	4.4e+00	6.7e+00	4.3e-01	5.2e-02	2.4e-01	8.6e-01	1.3e+00
Np-237	5.8e+00	7.1e-01	3.2e+00	1.2e+01	1.8e+01	1.1e+00	1.4e-01	6.3e-01	2.3e+00	3.5e+00
Pu-236	2.7e+00	3.3e-01	1.5e+00	5.3e+00	8.0e+00	5.2e-01	6.4e-02	2.9e-01	1.0e+00	1.6e+00
Pu-238	4.2e+00	5.2e-01	2.3e+00	8.5e+00	1.3e+01	8.3e-01	1.0e-01	4.6e-01	1.7e+00	2.6e+00
Pu-239	3.2e+00	3.9e-01	1.8e+00	6.4e+00	9.7e+00	6.3e-01	7.7e-02	3.5e-01	1.3e+00	1.9e+00
Pu-240	3.2e+00	3.9e-01	1.8e+00	6.4e+00	9.7e+00	6.3e-01	7.7e-02	3.5e-01	1.3e+00	1.9e+00
Pu-241	3.8e-02	4.6e-03	2.0e-02	7.6e-02	1.2e-01	7.4e-03	8.9e-04	4.0e-03	1.5e-02	2.3e-02
Pu-242	3.0e+00	3.5e-01	1.6e+00	6.0e+00	9.0e+00	5.8e-01	7.1e-02	3.2e-01	1.2e+00	1.8e+00
Pu-244	2.9e+00	3.5e-01	1.6e+00	5.7e+00	8.6e+00	5.6e-01	6.9e-02	3.1e-01	1.1e+00	1.7e+00
Am-241	1.0e+01	1.3e+00	5.7e+00	2.1e+01	3.2e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Am-242m	1.0e+01	1.3e+00	5.7e+00	2.1e+01	3.2e+01	2.1e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Am-243	1.0e+01	1.3e+00	5.7e+00	2.1e+01	3.2e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Cm-242	8.6e-01	1.0e-01	4.7e-01	1.7e+00	2.6e+00	1.7e-01	2.0e-02	9.4e-02	3.4e-01	5.2e-01
Cm-243	7.7e+00	9.3e-01	4.2e+00	1.5e+01	2.3e+01	1.5e+00	1.8e-01	8.3e-01	3.0e+00	4.6e+00
Cm-244	6.5e+00	7.9e-01	3.5e+00	1.3e+01	2.0e+01	1.3e+00	1.6e-01	7.0e-01	2.6e+00	3.9e+00
Cm-245	1.0e+01	1.3e+00	5.7e+00	2.1e+01	3.2e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Cm-246	1.0e+01	1.3e+00	5.7e+00	2.1e+01	3.2e+01	2.0e+00	2.5e-01	1.1e+00	4.1e+00	6.3e+00
Cm-247	9.7e+00	1.2e+00	5.3e+00	1.9e+01	2.9e+01	1.9e+00	2.3e-01	1.0e+00	3.8e+00	5.8e+00
Cm-248	3.7e+01	4.5e+00	2.0e+01	7.4e+01	1.1e+02	7.2e+00	8.8e-01	4.0e+00	1.4e+01	2.2e+01
Bk-249	4.0e-02	4.8e-03	2.2e-02	8.0e-02	1.2e-01	7.8e-03	9.6e-04	4.3e-03	1.6e-02	2.4e-02
Cf-248	1.9e+00	2.3e-01	1.0e+00	3.8e+00	5.7e+00	3.7e-01	4.5e-02	2.1e-01	7.4e-01	1.1e+00
Cf-249	1.7e+01	2.1e+00	9.5e+00	3.5e+01	5.3e+01	3.4e+00	4.2e-01	1.9e+00	6.9e+00	1.1e+01
Cf-250	8.3e+00	1.0e+00	4.6e+00	1.7e+01	2.5e+01	1.6e+00	2.0e-01	9.0e-01	3.3e+00	5.0e+00
Cf-251	1.8e+01	2.2e+00	9.7e+00	3.6e+01	5.4e+01	3.5e+00	4.3e-01	1.9e+00	7.0e+00	1.1e+01
Cf-252	4.6e+00	5.7e-01	2.5e+00	9.1e+00	1.4e+01	9.0e-01	1.1e-01	5.0e-01	1.8e+00	2.8e+00
Cf-254	2.5e+00	1.7e-01	1.1e+00	5.5e+00	8.6e+00	4.9e-01	3.4e-02	2.3e-01	1.1e+00	1.7e+00
Es-254	1.8e+00	2.2e-01	1.0e+00	3.6e+00	5.6e+00	3.6e-01	4.4e-02	2.0e-01	7.2e-01	1.1e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.25 Normalized effective doses from ingestion: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.0e-03	8.0e-05	9.6e-04	4.1e-03	6.6e-03	3.9e-04	1.6e-05	1.9e-04	8.1e-04	1.3e-03
P-32	1.1e-04	1.1e-08	2.4e-06	2.3e-04	5.0e-04	2.1e-05	2.3e-09	4.7e-07	4.4e-05	9.9e-05
S-35	6.7e-05	2.1e-06	2.9e-05	1.4e-04	2.3e-04	1.3e-05	4.2e-07	5.6e-06	2.9e-05	4.7e-05
Cl-36	3.0e-04	9.0e-06	1.3e-04	6.4e-04	1.0e-03	5.9e-05	1.8e-06	2.5e-05	1.3e-04	2.0e-04
K-40	4.2e-03	1.7e-04	2.1e-03	8.9e-03	1.4e-02	8.3e-04	3.4e-05	4.0e-04	1.7e-03	2.7e-03
Ca-41	3.8e-04	1.6e-05	1.8e-04	7.9e-04	1.2e-03	7.4e-05	3.0e-06	3.6e-05	1.5e-04	2.4e-04
Ca-45	5.9e-04	2.3e-05	2.8e-04	1.3e-03	2.0e-03	1.2e-04	4.5e-06	5.6e-05	2.5e-04	4.0e-04
Sc-46	7.7e-04	2.5e-05	3.3e-04	1.7e-03	2.7e-03	1.5e-04	4.8e-06	6.6e-05	3.3e-04	5.5e-04
Cr-51	2.1e-06	7.5e-09	3.0e-07	4.7e-06	8.7e-06	4.1e-07	1.5e-09	5.9e-08	9.2e-07	1.7e-06
Mn-53	3.5e-05	1.4e-06	1.7e-05	7.4e-05	1.2e-04	7.0e-06	2.8e-07	3.4e-06	1.4e-05	2.3e-05
Mn-54	6.4e-04	2.5e-05	3.1e-04	1.3e-03	2.1e-03	1.3e-04	4.9e-06	6.1e-05	2.6e-04	4.2e-04
Fe-55	1.1e-05	3.5e-07	4.7e-06	2.2e-05	3.6e-05	2.1e-06	6.7e-08	9.4e-07	4.3e-06	7.1e-06
Fe-59	1.4e-05	1.9e-07	3.9e-06	3.2e-05	5.4e-05	2.7e-06	3.9e-08	7.7e-07	6.3e-06	1.0e-05
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.3e-04	6.2e-06	9.1e-05	5.2e-04	8.3e-04	4.6e-05	1.2e-06	1.8e-05	1.0e-04	1.6e-04
Sr-89	8.4e-04	1.7e-05	2.9e-04	1.9e-03	3.2e-03	1.6e-04	3.5e-06	5.6e-05	3.8e-04	6.2e-04
Sr-90	3.9e-02	1.6e-03	1.9e-02	8.3e-02	1.3e-01	7.8e-03	3.2e-04	3.8e-03	1.6e-02	2.5e-02
Y-91	9.0e-04	2.2e-05	3.3e-04	2.0e-03	3.3e-03	1.8e-04	4.4e-06	6.6e-05	4.0e-04	6.5e-04
Zr-93	3.7e-04	1.5e-05	1.8e-04	7.6e-04	1.2e-03	7.2e-05	3.0e-06	3.5e-05	1.5e-04	2.3e-04
Zr-95	6.2e-04	2.0e-05	2.7e-04	1.3e-03	2.1e-03	1.2e-04	3.9e-06	5.3e-05	2.7e-04	4.2e-04
Nb-93m	1.5e-04	6.3e-06	7.5e-05	3.2e-04	5.1e-04	3.0e-05	1.2e-06	1.5e-05	6.3e-05	9.8e-05
Nb-94	2.2e-03	9.1e-05	1.1e-03	4.6e-03	7.3e-03	4.3e-04	1.8e-05	2.1e-04	9.0e-04	1.4e-03
Nb-95	1.2e-04	1.3e-06	2.9e-05	2.9e-04	5.0e-04	2.4e-05	2.6e-07	5.8e-06	5.7e-05	1.0e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	3.0e-05	5.2e-07	9.7e-06	6.8e-05	1.1e-04	5.8e-06	1.1e-07	1.9e-06	1.3e-05	2.2e-05
Sb-125	4.7e-05	1.3e-06	2.0e-05	1.0e-04	1.7e-04	9.3e-06	2.7e-07	4.0e-06	2.0e-05	3.2e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.4e-03	2.6e-05	4.8e-04	3.2e-03	5.5e-03	2.8e-04	5.2e-06	9.4e-05	6.3e-04	1.1e-03
I-129	3.5e-02	1.0e-03	1.5e-02	7.8e-02	1.2e-01	6.9e-03	2.0e-04	3.0e-03	1.5e-02	2.4e-02
I-131	1.1e-04	7.7e-12	5.6e-09	1.3e-04	4.7e-04	2.2e-05	1.5e-12	1.1e-08	2.5e-05	9.1e-05
Cs-134	5.5e-04	1.7e-05	2.4e-04	1.1e-03	1.9e-03	1.1e-04	3.4e-06	4.7e-05	2.2e-04	3.6e-04
Cs-135	8.5e-05	2.1e-06	2.8e-05	1.3e-04	2.2e-04	1.3e-05	4.1e-07	5.5e-06	2.6e-05	4.3e-05
Cs-137	4.2e-04	1.3e-05	1.8e-04	8.6e-04	1.4e-03	8.2e-05	2.6e-06	3.6e-05	1.7e-04	2.8e-04
Ba-133	1.3e-03	5.2e-05	8.2e-04	2.7e-03	4.2e-03	2.5e-04	1.0e-05	1.2e-04	5.2e-04	8.1e-04
Ce-139	1.9e-04	6.9e-06	8.7e-05	4.0e-04	6.4e-04	3.7e-05	1.4e-06	1.7e-05	7.9e-05	1.3e-04
Ce-141	1.4e-04	1.2e-06	3.0e-05	3.3e-04	5.7e-04	2.7e-05	2.4e-07	5.8e-06	6.4e-05	1.1e-04
Ce-144	5.0e-03	2.0e-04	2.4e-03	1.1e-02	1.7e-02	9.9e-04	3.9e-05	4.8e-04	2.1e-03	3.3e-03
Pm-147	3.1e-04	1.3e-05	1.5e-04	6.5e-04	1.0e-03	6.0e-05	2.4e-06	3.0e-05	1.3e-04	2.0e-04

Table F2.25 Normalized effective doses from ingestion: Processing steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.3e-04	5.2e-06	6.2e-05	2.7e-04	4.2e-04	2.5e-05	1.0e-06	1.2e-05	5.2e-05	8.1e-05
Eu-152	1.8e-03	7.4e-05	8.7e-04	3.7e-03	5.9e-03	3.5e-04	1.4e-05	1.7e-04	7.3e-04	1.1e-03
Eu-154	2.5e-03	1.0e-04	1.2e-03	5.3e-03	8.3e-03	5.0e-04	2.0e-05	2.4e-04	1.0e-03	1.6e-03
Eu-155	4.0e-04	1.6e-05	1.9e-04	8.3e-04	1.3e-03	7.8e-05	3.2e-06	3.8e-05	1.6e-04	2.5e-04
Gd-153	2.5e-04	9.7e-06	1.2e-04	5.2e-04	8.2e-04	4.8e-05	1.9e-06	2.4e-05	1.0e-04	1.6e-04
Tb-160	7.3e-04	2.1e-05	3.0e-04	1.6e-03	2.6e-03	1.4e-04	4.2e-06	5.9e-05	3.2e-04	5.1e-04
Tm-170	9.0e-04	3.3e-05	4.2e-04	1.9e-03	3.1e-03	1.8e-04	6.6e-06	8.3e-05	3.8e-04	6.0e-04
Tm-171	1.3e-04	5.1e-06	6.1e-05	2.6e-04	4.1e-04	2.5e-05	1.0e-06	1.2e-05	5.1e-05	8.2e-05
Ta-182	9.7e-04	3.5e-05	4.4e-04	2.1e-03	3.3e-03	1.9e-04	6.9e-06	8.8e-05	4.1e-04	6.6e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.7e-01	1.5e-02	1.8e-01	7.8e-01	1.2e+00	7.3e-02	3.0e-03	3.6e-02	1.5e-01	2.4e-01
Ra-228	8.5e-01	3.5e-02	4.1e-01	1.8e+00	2.8e+00	1.7e-01	6.8e-03	8.2e-02	3.5e-01	5.4e-01
Ac-227	1.6e+00	6.4e-02	7.5e-01	3.3e+00	5.1e+00	3.0e-01	1.2e-02	1.5e-01	6.3e-01	9.9e-01
Th-228	1.2e-01	4.9e-03	5.9e-02	2.5e-01	4.0e-01	2.4e-02	9.7e-04	1.2e-02	4.9e-02	7.8e-02
Th-229	4.1e-01	1.7e-02	2.0e-01	8.7e-01	1.4e+00	8.1e-02	3.4e-03	4.0e-02	1.7e-01	2.6e-01
Th-230	1.1e-01	4.7e-03	5.5e-02	2.4e-01	3.7e-01	2.2e-02	9.2e-04	1.1e-02	4.6e-02	7.2e-02
Th-232	1.6e-01	6.4e-03	7.4e-02	3.2e-01	5.1e-01	3.1e-02	1.3e-03	1.5e-02	6.3e-02	1.0e-01
Pa-231	9.4e-01	3.9e-02	4.5e-01	2.0e+00	3.1e+00	1.8e-01	7.6e-03	9.0e-02	3.8e-01	6.0e-01
U-232	6.4e-02	2.6e-03	3.0e-02	1.3e-01	2.1e-01	1.3e-02	5.1e-04	6.0e-03	2.6e-02	4.1e-02
U-233	1.1e-02	4.6e-04	5.4e-03	2.3e-02	3.6e-02	2.2e-03	8.9e-05	1.1e-03	4.5e-03	7.0e-03
U-234	1.1e-02	4.5e-04	5.2e-03	2.3e-02	3.5e-02	2.1e-03	8.7e-05	1.0e-03	4.4e-03	6.9e-03
U-235	1.1e-02	4.6e-04	5.5e-03	2.4e-02	3.7e-02	2.2e-03	9.0e-05	1.1e-03	4.6e-03	7.1e-03
U-236	1.0e-02	4.2e-04	5.0e-03	2.1e-02	3.4e-02	2.0e-03	8.3e-05	9.8e-04	4.2e-03	6.5e-03
U-238	1.4e-02	5.8e-04	6.9e-03	3.0e-02	4.7e-02	2.8e-03	1.2e-04	1.4e-03	5.8e-03	9.1e-03
Np-237	1.4e-01	5.9e-03	7.0e-02	3.0e-01	4.7e-01	2.8e-02	1.2e-03	1.4e-02	5.9e-02	9.1e-02
Pu-236	1.0e-01	4.2e-03	5.0e-02	2.2e-01	3.4e-01	2.0e-02	8.2e-04	9.8e-03	4.2e-02	6.6e-02
Pu-238	3.0e-01	1.2e-02	1.4e-01	6.2e-01	9.8e-01	5.8e-02	2.4e-03	2.9e-02	1.2e-01	1.9e-01
Pu-239	3.2e-01	1.3e-02	1.6e-01	6.8e-01	1.1e+00	6.4e-02	2.6e-03	3.1e-02	1.3e-01	2.1e-01
Pu-240	3.2e-01	1.3e-02	1.6e-01	6.8e-01	1.1e+00	6.4e-02	2.6e-03	3.1e-02	1.3e-01	2.1e-01
Pu-241	6.1e-03	2.5e-04	3.0e-03	1.3e-02	2.0e-02	1.2e-03	5.0e-05	5.9e-04	2.5e-03	3.9e-03
Pu-242	3.1e-01	1.3e-02	1.5e-01	6.5e-01	1.0e+00	6.1e-02	2.5e-03	3.0e-02	1.3e-01	2.0e-01
Pu-244	3.1e-01	1.3e-02	1.5e-01	6.5e-01	1.0e+00	6.1e-02	2.5e-03	3.0e-02	1.3e-01	2.0e-01
Am-241	2.6e-01	1.1e-02	1.3e-01	5.4e-01	8.5e-01	5.1e-02	2.1e-03	2.5e-02	1.1e-01	1.6e-01
Am-242m	2.6e-01	1.1e-02	1.3e-01	5.4e-01	8.6e-01	5.1e-02	2.1e-03	2.5e-02	1.1e-01	1.7e-01
Am-243	2.6e-01	1.1e-02	1.3e-01	5.4e-01	8.6e-01	5.1e-02	2.1e-03	2.5e-02	1.1e-01	1.7e-01
Cm-242	1.0e-02	3.9e-04	4.8e-03	2.1e-02	3.3e-02	2.0e-03	7.7e-05	9.5e-04	4.1e-03	6.6e-03
Cm-243	1.9e-01	8.0e-03	9.4e-02	4.0e-01	6.3e-01	3.8e-02	1.6e-03	1.9e-02	7.9e-02	1.2e-01
Cm-244	1.5e-01	6.3e-03	7.5e-02	3.2e-01	5.1e-01	3.0e-02	1.2e-03	1.5e-02	6.3e-02	9.8e-02
Cm-245	2.7e-01	1.1e-02	1.3e-01	5.7e-01	8.9e-01	5.4e-02	2.2e-03	2.6e-02	1.1e-01	1.7e-01
Cm-246	2.7e-01	1.1e-02	1.3e-01	5.7e-01	8.9e-01	5.4e-02	2.2e-03	2.6e-02	1.1e-01	1.7e-01
Cm-247	2.5e-01	1.0e-02	1.2e-01	5.1e-01	8.1e-01	4.8e-02	2.0e-03	2.4e-02	1.0e-01	1.6e-01
Cm-248	1.0e+00	4.1e-02	4.8e-01	2.1e+00	3.3e+00	2.0e-01	8.0e-03	9.6e-02	4.1e-01	6.4e-01
Bk-249	1.2e-03	5.1e-05	6.0e-04	2.6e-03	4.1e-03	2.4e-04	9.9e-06	1.2e-04	5.0e-04	7.9e-04
Cf-248	3.0e-02	1.2e-03	1.5e-02	6.3e-02	9.8e-02	5.9e-03	2.4e-04	2.9e-03	1.2e-02	1.9e-02
Cf-249	1.5e-01	1.9e-02	2.2e-01	9.5e-01	1.5e+00	8.9e-02	3.7e-03	4.4e-02	1.8e-01	2.9e-01
Cf-250	2.0e-01	8.4e-03	9.9e-02	4.2e-01	6.8e-01	4.0e-02	1.6e-03	2.0e-02	8.3e-02	1.3e-01
Cf-251	4.7e-01	1.9e-02	2.3e-01	9.7e-01	1.5e+00	9.2e-02	3.8e-03	4.5e-02	1.9e-01	3.0e-01
Cf-252	1.1e-01	4.3e-03	5.2e-02	2.2e-01	3.5e-01	2.1e-02	8.5e-04	1.0e-02	4.3e-02	6.8e-02
Cf-254	1.6e-01	3.9e-03	5.9e-02	3.5e-01	5.6e-01	3.1e-02	7.8e-04	1.2e-02	6.8e-02	1.1e-01
Es-254	3.0e-02	1.2e-03	1.5e-02	6.2e-02	9.9e-02	5.9e-03	2.4e-04	2.9e-03	1.2e-02	2.0e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.26 Normalized effective doses from all pathways: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	2.2e-04	8.4e-05	1.9e-04	3.6e-04	4.3e-04	4.2e-05	1.7e-05	3.8e-05	7.0e-05	8.4e-05
C-14	1.4e-04	2.4e-07	1.1e-04	3.0e-04	4.0e-04	2.7e-05	4.8e-08	2.1e-05	5.9e-05	7.8e-05
Na-22	4.3e-01	1.2e-03	4.6e-03	1.7e+00	2.7e+00	8.5e-02	2.4e-04	9.1e-04	3.3e-01	5.5e-01
P-32	6.2e-05	1.5e-07	1.0e-06	1.9e-04	3.8e-04	1.2e-05	3.1e-08	2.0e-07	3.8e-05	7.5e-05
S-35	7.6e-05	2.2e-07	1.1e-06	2.4e-04	4.2e-04	1.5e-05	4.5e-08	2.3e-07	4.6e-05	8.4e-05
Cl-36	1.6e+00	1.5e-01	7.7e-01	3.6e+00	5.5e+00	3.1e-01	2.9e-02	1.5e-01	7.1e-01	1.1e+00
K-40	7.4e-02	2.5e-04	7.7e-04	3.0e-01	4.7e-01	1.5e-02	5.0e-05	1.5e-04	5.7e-02	9.4e-02
Ca-41	5.6e-05	2.2e-07	8.3e-07	1.9e-04	3.3e-04	1.1e-05	4.6e-08	1.6e-07	3.7e-05	6.4e-05
Ca-45	1.2e-04	6.6e-07	1.9e-06	4.9e-04	7.9e-04	2.4e-05	1.3e-07	3.7e-07	9.7e-05	1.6e-04
Sc-46	5.0e-03	1.9e-05	8.0e-05	1.8e-02	3.2e-02	9.8e-04	3.8e-06	1.6e-05	3.6e-03	6.3e-03
Cr-51	2.9e-06	2.8e-08	1.4e-07	8.9e-06	1.8e-05	5.7e-07	5.7e-09	2.7e-08	1.7e-06	3.5e-06
Mn-53	7.3e-07	1.9e-08	5.0e-08	2.4e-06	4.6e-06	1.4e-07	3.9e-09	9.6e-09	4.7e-07	9.0e-07
Mn-54	1.1e-03	2.0e-05	7.8e-05	3.4e-03	6.9e-03	2.2e-04	3.9e-06	1.5e-05	6.7e-04	1.4e-03
Fe-55	8.4e-06	6.8e-08	2.2e-07	2.8e-05	5.7e-05	1.6e-06	1.4e-08	4.3e-08	5.6e-06	1.1e-05
Fe-59	2.1e-04	1.3e-06	5.6e-06	6.5e-04	1.3e-03	4.1e-05	2.7e-07	1.1e-06	1.3e-04	2.6e-04
Co-56	1.2e-03	7.5e-06	3.3e-05	3.9e-03	7.8e-03	2.4e-04	1.5e-06	6.5e-06	7.7e-04	1.5e-03
Co-57	1.4e-04	8.8e-07	3.7e-06	4.4e-04	9.0e-04	2.7e-05	1.7e-07	7.2e-07	8.7e-05	1.8e-04
Co-58	3.1e-04	1.9e-06	8.3e-06	9.8e-04	2.0e-03	6.1e-05	3.8e-07	1.6e-06	1.9e-04	3.9e-04
Co-60	5.4e-03	3.4e-05	1.4e-04	1.7e-02	3.5e-02	1.1e-03	6.8e-06	2.8e-05	3.4e-03	6.9e-03
Ni-59	2.3e-06	1.8e-08	5.9e-08	7.3e-06	1.5e-05	4.5e-07	3.5e-09	1.2e-08	1.4e-06	3.1e-06
Ni-63	6.0e-06	4.7e-08	1.5e-07	1.9e-05	4.0e-05	1.2e-06	9.4e-09	3.0e-08	3.8e-06	8.0e-06
Zn-65	1.1e-01	5.3e-04	1.6e-03	4.5e-01	7.1e-01	2.2e-02	1.1e-04	3.2e-04	8.8e-02	1.4e-01
As-73	4.1e-04	1.7e-06	5.7e-06	1.6e-03	2.5e-03	8.0e-05	3.4e-07	1.1e-06	3.1e-04	5.1e-04
Se-75	5.4e-03	2.1e-04	7.2e-04	1.8e-02	3.1e-02	1.1e-03	4.3e-05	1.4e-04	3.5e-03	6.0e-03
Sr-85	9.1e-04	3.6e-06	1.5e-05	3.4e-03	5.9e-03	1.8e-04	7.1e-07	3.0e-06	6.7e-04	1.2e-03
Sr-89	2.3e-04	1.2e-06	3.7e-06	9.2e-04	1.5e-03	4.5e-05	2.5e-07	7.3e-07	1.8e-04	2.9e-04
Sr-90	7.1e-03	3.8e-05	1.1e-04	2.8e-02	4.5e-02	1.4e-03	7.7e-06	2.2e-05	5.5e-03	8.9e-03
Y-91	3.4e-04	1.8e-06	5.3e-06	1.4e-03	2.2e-03	6.7e-05	3.6e-07	1.0e-06	2.7e-04	4.2e-04
Zr-93	2.4e-04	1.2e-06	3.9e-06	9.7e-04	1.5e-03	4.8e-05	2.3e-07	7.6e-07	1.9e-04	3.0e-04
Zr-95	1.3e-03	5.3e-06	2.2e-05	5.1e-03	8.6e-03	2.6e-04	1.1e-06	4.4e-06	9.8e-04	1.7e-03
Nb-93m	5.6e-05	2.9e-07	8.7e-07	2.3e-04	3.7e-04	1.1e-05	5.9e-08	1.7e-07	4.5e-05	7.1e-05
Nb-94	2.6e-02	1.0e-04	4.2e-04	9.9e-02	1.6e-01	5.1e-03	2.0e-05	8.2e-05	1.9e-02	3.3e-02
Nb-95	5.9e-04	2.1e-06	9.7e-06	2.1e-03	3.8e-03	1.2e-04	4.2e-07	1.9e-06	4.2e-04	7.4e-04
Mo-93	5.4e-05	4.7e-07	1.4e-06	1.9e-04	3.6e-04	1.1e-05	9.3e-08	2.8e-07	3.7e-05	7.1e-05
Tc-97	2.3e-05	1.5e-07	5.9e-07	7.6e-05	1.5e-04	4.6e-06	3.1e-08	1.2e-07	1.5e-05	3.0e-05
Tc-97m	2.6e-05	1.9e-07	6.7e-07	8.7e-05	1.7e-04	5.1e-06	3.8e-08	1.3e-07	1.7e-05	3.3e-05
Tc-99	1.1e-04	5.4e-07	2.7e-06	3.1e-04	6.8e-04	2.2e-05	1.1e-07	5.2e-07	6.2e-05	1.3e-04
Ru-103	7.1e-05	4.6e-07	1.9e-06	2.3e-04	4.6e-04	1.4e-05	9.1e-08	3.8e-07	4.5e-05	9.1e-05
Ru-106	7.7e-04	6.1e-06	2.0e-05	2.6e-03	5.0e-03	1.5e-04	1.2e-06	4.0e-06	5.2e-04	9.9e-04
Ag-108m	5.1e-03	2.2e-04	1.2e-03	1.3e-02	2.6e-02	1.0e-03	4.5e-05	2.4e-04	2.5e-03	5.2e-03
Ag-110m	3.8e-03	1.7e-04	8.9e-04	9.5e-03	1.9e-02	7.4e-04	3.3e-05	1.8e-04	1.9e-03	3.8e-03
Cd-109	1.3e-02	7.4e-05	2.0e-04	5.3e-02	8.2e-02	2.6e-03	1.5e-05	3.9e-05	1.0e-02	1.6e-02
Sn-113	3.2e-04	1.1e-06	4.4e-06	1.2e-03	2.1e-03	6.4e-05	2.2e-07	8.7e-07	2.4e-04	4.1e-04
Sb-124	5.8e-02	2.4e-05	1.2e-04	2.3e-01	3.8e-01	1.2e-02	4.7e-06	2.4e-05	4.5e-02	7.7e-02
Sb-125	1.1e-01	4.5e-05	2.3e-04	4.3e-01	7.2e-01	2.2e-02	8.8e-06	4.5e-05	8.6e-02	1.4e-01
Te-123m	8.3e-03	6.7e-05	2.1e-04	3.3e-02	5.3e-02	1.6e-03	1.3e-05	4.1e-05	6.6e-03	1.1e-02
Te-127m	4.5e-03	4.4e-05	1.1e-04	1.9e-02	3.0e-02	9.0e-04	9.0e-06	2.1e-05	3.7e-03	5.8e-03
I-125	1.0e+00	3.0e-01	8.9e-01	1.9e+00	2.3e+00	2.0e-01	6.0e-02	1.8e-01	3.6e-01	4.4e-01
I-129	1.4e+01	4.3e+00	1.2e+01	2.5e+01	3.1e+01	2.8e+00	8.5e-01	2.5e+00	5.0e+00	6.0e+00
I-131	7.1e-02	4.8e-03	3.8e-02	1.8e-01	2.4e-01	1.4e-02	9.5e-04	7.6e-03	3.5e-02	4.7e-02
Cs-134	3.5e-01	2.2e-03	7.2e-03	1.4e+00	2.3e+00	7.0e-02	4.5e-04	1.4e-03	2.7e-01	4.5e-01
Cs-135	8.2e-03	5.2e-05	1.7e-04	3.1e-02	5.2e-02	1.6e-03	1.1e-05	3.3e-05	6.2e-03	1.0e-02
Cs-137	1.9e-01	1.2e-03	3.8e-03	7.5e-01	1.2e+00	3.8e-02	2.5e-04	7.5e-04	1.5e-01	2.4e-01
Ba-133	5.9e-03	2.2e-05	9.6e-05	2.2e-02	3.8e-02	1.2e-03	4.5e-06	1.9e-05	4.3e-03	7.6e-03
Ce-139	6.6e-04	2.7e-06	1.1e-05	2.5e-03	4.3e-03	1.3e-04	5.4e-07	2.1e-06	4.9e-04	8.4e-04
Ce-141	1.0e-04	4.7e-07	1.7e-06	4.0e-04	8.6e-04	2.1e-05	9.6e-08	3.4e-07	7.9e-05	1.3e-04
Ce-144	2.7e-03	1.4e-05	4.3e-05	1.1e-02	1.7e-02	5.4e-04	2.8e-06	8.5e-06	2.2e-03	3.5e-03
Pm-147	1.2e-04	6.2e-07	1.9e-06	4.9e-04	7.9e-04	2.5e-05	1.2e-07	3.8e-07	9.7e-05	1.6e-04

Table F2.26 Normalized effective doses from all pathways: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	9.6e-05	4.5e-07	1.5e-06	3.7e-04	6.0e-04	1.9e-05	9.0e-08	2.9e-07	7.4e-05	1.2e-04
Eu-152	1.8e-02	7.1e-05	2.9e-04	6.9e-02	1.2e-01	3.5e-03	1.4e-05	5.6e-05	1.4e-02	2.3e-02
Eu-154	1.9e-02	7.8e-05	3.1e-04	7.5e-02	1.2e-01	3.8e-03	1.6e-05	6.1e-05	1.5e-02	2.4e-02
Eu-155	9.5e-04	4.2e-06	1.5e-05	3.8e-03	6.1e-03	1.9e-04	8.5e-07	3.0e-06	7.5e-04	1.2e-03
Gd-153	7.1e-04	2.8e-06	1.2e-05	2.7e-03	4.6e-03	1.4e-04	5.7e-07	2.3e-06	5.3e-04	9.1e-04
Tb-160	2.4e-03	9.4e-06	3.9e-05	8.9e-03	1.5e-02	4.6e-04	1.9e-06	7.7e-06	1.7e-03	3.0e-03
Tm-170	3.0e-04	1.6e-06	4.6e-06	1.2e-03	1.9e-03	5.9e-05	3.3e-07	9.1e-07	2.4e-04	3.8e-04
Tm-171	4.4e-05	2.3e-07	6.8e-07	1.8e-04	2.7e-04	8.6e-06	4.6e-08	1.3e-07	3.5e-05	5.5e-05
Ta-182	4.5e-03	1.8e-05	7.4e-05	1.7e-02	2.9e-02	8.8e-04	3.6e-06	1.5e-05	3.3e-03	5.8e-03
W-181	2.3e-05	1.5e-07	6.2e-07	7.2e-05	1.5e-04	4.6e-06	3.0e-08	1.2e-07	1.4e-05	3.0e-05
W-185	1.1e-05	5.9e-08	2.7e-07	3.0e-05	6.4e-05	2.2e-06	1.2e-08	5.4e-08	6.1e-06	1.3e-05
Os-185	3.9e-02	1.6e-04	6.3e-04	1.5e-01	2.5e-01	7.8e-03	3.2e-05	1.3e-04	3.0e-02	5.1e-02
Ir-192	2.9e-04	1.8e-06	7.6e-06	9.3e-04	1.9e-03	5.7e-05	3.6e-07	1.5e-06	1.9e-04	3.7e-04
Tl-204	8.3e-03	4.2e-05	1.3e-04	3.2e-02	5.1e-02	1.6e-03	8.6e-06	2.6e-05	6.3e-03	1.0e-02
Pb-210	2.6e+00	1.7e-02	3.9e-02	1.1e+01	1.7e+01	5.2e-01	3.5e-03	7.7e-03	2.3e+00	3.4e+00
Bi-207	4.7e-01	1.9e-03	7.5e-03	1.8e+00	3.0e+00	9.2e-02	3.8e-04	1.5e-03	3.6e-01	6.0e-01
Po-210	1.5e+00	7.9e-03	2.2e-02	6.1e+00	9.6e+00	2.9e-01	1.6e-03	4.3e-03	1.2e+00	1.9e+00
Ra-226	1.3e-01	6.8e-04	1.9e-03	5.1e-01	7.9e-01	2.5e-02	1.4e-04	3.8e-04	1.0e-01	1.6e-01
Ra-228	1.2e-01	7.1e-04	1.9e-03	5.2e-01	7.9e-01	2.4e-02	1.4e-04	3.7e-04	1.0e-01	1.6e-01
Ac-227	2.0e+00	9.1e-03	3.1e-02	7.8e+00	1.3e+01	3.9e-01	1.8e-03	6.1e-03	1.5e+00	2.5e+00
Th-228	9.8e-01	4.4e-03	1.5e-02	3.8e+00	6.2e+00	1.9e-01	8.7e-04	3.0e-03	7.5e-01	1.2e+00
Th-229	1.9e+00	8.5e-03	2.9e-02	7.3e+00	1.2e+01	3.7e-01	1.7e-03	5.8e-03	1.5e+00	2.3e+00
Th-230	3.3e-01	1.5e-03	5.1e-03	1.3e+00	2.1e+00	6.4e-02	3.0e-04	1.0e-03	2.5e-01	4.1e-01
Th-232	5.7e-01	2.6e-03	8.8e-03	2.2e+00	3.6e+00	1.1e-01	5.2e-04	1.7e-03	4.4e-01	7.0e-01
Pa-231	8.1e-01	3.8e-03	1.3e-02	3.2e+00	5.2e+00	1.6e-01	7.6e-04	2.5e-03	6.4e-01	1.0e+00
U-232	8.6e-01	3.9e-03	1.4e-02	3.4e+00	5.5e+00	1.7e-01	7.9e-04	2.7e-03	6.8e-01	1.1e+00
U-233	2.1e-01	9.6e-04	3.4e-03	8.3e-01	1.3e+00	4.2e-02	1.9e-04	6.6e-04	1.7e-01	2.7e-01
U-234	2.1e-01	9.4e-04	3.3e-03	8.1e-01	1.3e+00	4.1e-02	1.9e-04	6.5e-04	1.6e-01	2.6e-01
U-235	1.9e-01	8.7e-04	3.0e-03	7.5e-01	1.2e+00	3.8e-02	1.7e-04	5.9e-04	1.5e-01	2.4e-01
U-236	1.9e-01	8.8e-04	3.1e-03	7.5e-01	1.2e+00	3.8e-02	1.8e-04	6.0e-04	1.5e-01	2.4e-01
U-238	1.8e-01	8.3e-04	2.9e-03	7.1e-01	1.1e+00	3.6e-02	1.7e-04	5.6e-04	1.4e-01	2.3e-01
Np-237	5.1e-01	2.3e-03	8.0e-03	2.0e+00	3.3e+00	1.0e-01	4.7e-04	1.6e-03	3.9e-01	6.4e-01
Pu-236	2.3e-01	1.0e-03	3.6e-03	8.9e-01	1.4e+00	4.5e-02	2.0e-04	7.0e-04	1.7e-01	2.9e-01
Pu-238	3.7e-01	1.7e-03	5.8e-03	1.5e+00	2.4e+00	7.3e-02	3.4e-04	1.1e-03	2.9e-01	4.7e-01
Pu-239	3.7e-01	1.7e-03	5.9e-03	1.5e+00	2.4e+00	7.4e-02	3.4e-04	1.2e-03	2.9e-01	4.7e-01
Pu-240	3.7e-01	1.7e-03	5.9e-03	1.5e+00	2.4e+00	7.4e-02	3.4e-04	1.2e-03	2.9e-01	4.7e-01
Pu-241	4.1e-03	1.9e-05	6.4e-05	1.6e-02	2.6e-02	8.0e-04	3.9e-06	1.3e-05	3.2e-03	5.2e-03
Pu-242	3.5e-01	1.6e-03	5.5e-03	1.4e+00	2.2e+00	6.9e-02	3.2e-04	1.1e-03	2.7e-01	4.4e-01
Pu-244	3.3e-01	1.5e-03	5.2e-03	1.3e+00	2.1e+00	6.5e-02	3.1e-04	1.0e-03	2.6e-01	4.2e-01
Am-241	9.5e-01	4.3e-03	1.5e-02	3.7e+00	6.1e+00	1.9e-01	8.5e-04	2.9e-03	7.4e-01	1.2e+00
Am-242m	9.2e-01	4.2e-03	1.5e-02	3.6e+00	5.9e+00	1.8e-01	8.3e-04	2.8e-03	7.2e-01	1.2e+00
Am-243	9.5e-01	4.3e-03	1.5e-02	3.7e+00	6.1e+00	1.9e-01	8.6e-04	2.9e-03	7.4e-01	1.2e+00
Cm-242	8.7e-02	4.2e-04	1.5e-03	3.7e-01	6.2e-01	1.9e-02	8.3e-05	3.0e-04	7.4e-02	1.2e-01
Cm-243	7.0e-01	3.2e-03	1.1e-02	2.8e+00	4.5e+00	1.4e-01	6.3e-04	2.2e-03	5.4e-01	8.9e-01
Cm-244	6.0e-01	2.7e-03	9.4e-03	2.4e+00	3.9e+00	1.2e-01	5.4e-04	1.9e-03	4.6e-01	7.7e-01
Cm-245	9.7e-01	4.4e-03	1.5e-02	3.8e+00	6.3e+00	1.9e-01	8.7e-04	3.0e-03	7.5e-01	1.2e+00
Cm-246	9.7e-01	4.3e-03	1.5e-02	3.8e+00	6.3e+00	1.9e-01	8.7e-04	3.0e-03	7.5e-01	1.2e+00
Cm-247	8.8e-01	4.0e-03	1.4e-02	3.4e+00	5.7e+00	1.7e-01	7.9e-04	2.7e-03	6.8e-01	1.1e+00
Cm-248	3.4e+00	1.5e-02	5.3e-02	1.3e+01	2.2e+01	6.7e-01	3.0e-03	1.1e-02	2.6e+00	4.3e+00
Bk-249	3.4e-03	1.5e-05	5.2e-05	1.3e-02	2.1e-02	6.6e-04	2.9e-06	1.0e-05	2.6e-03	4.2e-03
Cf-248	1.8e-01	7.9e-04	2.8e-03	6.9e-01	1.2e+00	3.6e-02	1.6e-04	5.5e-04	1.4e-01	2.3e-01
Cf-249	1.6e+00	7.2e-03	2.5e-02	6.2e+00	1.0e+01	3.2e-01	1.4e-03	4.9e-03	1.2e+00	2.1e+00
Cf-250	7.8e-01	3.4e-03	1.2e-02	3.0e+00	5.0e+00	1.5e-01	6.9e-04	2.3e-03	5.9e-01	9.9e-01
Cf-251	1.6e+00	7.3e-03	2.5e-02	6.3e+00	1.1e+01	3.3e-01	1.5e-03	4.9e-03	1.2e+00	2.1e+00
Cf-252	4.3e-01	1.9e-03	6.5e-03	1.6e+00	2.7e+00	8.4e-02	3.8e-04	1.3e-03	3.2e-01	5.4e-01
Cf-254	6.2e-01	2.5e-03	9.5e-03	2.3e+00	3.9e+00	1.2e-01	5.1e-04	1.9e-03	4.6e-01	7.6e-01
Es-254	1.8e-01	8.1e-04	2.8e-03	7.0e-01	1.1e+00	3.5e-02	1.6e-04	5.5e-04	1.4e-01	2.2e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.27 Normalized effective doses from external exposure: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.8e-05	3.0e-08	1.4e-05	4.2e-05	5.2e-05	3.5e-08	5.9e-09	2.8e-08	8.2e-08	1.0e-05
Na-22	4.1e-01	1.1e-03	4.4e-03	1.6e+00	2.6e+00	8.1e-02	2.2e-04	8.6e-04	3.1e-01	5.2e-01
P-32	9.0e-06	2.0e-08	1.5e-07	2.7e-05	5.6e-05	1.8e-08	3.9e-09	2.9e-08	5.3e-06	1.1e-05
S-35	2.2e-08	7.5e-11	3.5e-10	7.8e-08	1.4e-07	4.3e-09	1.5e-11	6.9e-11	1.5e-08	2.8e-08
Cl-36	2.8e-02	6.7e-03	2.4e-02	5.1e-02	6.2e-02	5.5e-03	1.3e-03	4.8e-03	1.0e-02	1.2e-02
K-40	5.1e-02	1.4e-04	5.4e-04	2.0e-01	3.3e-01	1.0e-02	2.7e-05	1.1e-04	3.9e-02	6.5e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.0e-07	7.3e-10	3.2e-09	7.2e-07	1.2e-06	3.8e-08	1.4e-10	6.2e-10	1.4e-07	2.5e-07
Sc-46	4.7e-03	1.7e-05	7.7e-05	1.7e-02	3.0e-02	9.4e-04	3.5e-06	1.5e-05	3.4e-03	6.1e-03
Cr-51	2.6e-06	2.3e-08	1.2e-07	7.8e-06	1.6e-05	5.1e-07	4.6e-09	2.4e-08	1.5e-06	3.2e-06
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.1e-03	1.9e-05	7.7e-05	3.4e-03	6.8e-03	2.2e-04	3.8e-06	1.5e-05	6.6e-04	1.3e-03
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.8e-04	1.1e-06	5.0e-06	5.6e-04	1.2e-03	3.5e-05	2.1e-07	1.0e-06	1.1e-04	2.3e-04
Co-56	1.2e-03	6.7e-06	3.1e-05	3.6e-03	7.4e-03	2.3e-04	1.4e-06	6.1e-06	7.3e-04	1.5e-03
Co-57	1.3e-04	7.7e-07	3.5e-06	4.1e-04	8.5e-04	2.6e-05	1.5e-07	6.8e-07	8.0e-05	1.7e-04
Co-58	2.9e-04	1.7e-06	7.8e-06	9.2e-04	1.8e-03	5.8e-05	3.4e-07	1.5e-06	1.8e-04	3.6e-04
Co-60	5.2e-03	3.1e-05	1.4e-04	1.6e-02	3.4e-02	1.0e-03	6.2e-06	2.7e-05	3.3e-03	6.7e-03
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	7.7e-02	2.9e-04	1.2e-03	3.0e-01	4.9e-01	1.5e-02	5.9e-05	2.3e-04	5.9e-02	9.9e-02
As-73	9.7e-05	3.0e-07	1.4e-06	3.6e-04	6.1e-04	1.9e-05	6.1e-08	2.8e-07	7.1e-05	1.2e-04
Se-75	3.2e-03	1.1e-04	4.3e-04	1.1e-02	1.8e-02	6.3e-04	2.1e-05	8.5e-05	2.1e-03	3.6e-03
Sr-85	8.8e-04	3.3e-06	1.4e-05	3.3e-03	5.6e-03	1.7e-04	6.5e-07	2.9e-06	6.4e-04	1.1e-03
Sr-89	8.9e-05	3.3e-07	1.5e-06	3.3e-04	5.7e-04	1.8e-05	6.5e-08	2.9e-07	6.5e-05	1.1e-04
Sr-90	1.8e-03	8.9e-06	2.9e-05	6.8e-03	1.2e-02	3.5e-04	1.4e-06	5.8e-06	1.4e-03	2.3e-03
Y-91	1.2e-04	4.4e-07	1.9e-06	4.4e-04	7.6e-04	2.3e-05	8.8e-08	3.8e-07	8.6e-05	1.5e-04
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	1.2e-03	4.5e-06	2.1e-05	4.6e-03	8.0e-03	2.4e-04	9.2e-07	4.1e-06	9.1e-04	1.6e-03
Nb-93m	1.1e-05	4.1e-08	1.8e-07	4.1e-05	6.9e-05	2.1e-06	8.1e-09	3.5e-08	8.0e-06	1.4e-05
Nb-94	2.5e-02	9.2e-05	4.0e-04	9.3e-02	1.6e-01	4.8e-03	1.8e-05	7.9e-05	1.8e-02	3.1e-02
Nb-95	5.6e-04	1.9e-06	9.2e-06	2.0e-03	3.5e-03	1.1e-04	3.8e-07	1.8e-06	3.9e-04	7.1e-04
Mo-93	1.0e-05	8.1e-08	2.7e-07	3.3e-05	6.6e-05	2.0e-06	1.2e-08	5.2e-08	6.6e-06	1.3e-05
Tc-97	1.2e-05	7.3e-08	3.2e-07	3.8e-05	7.8e-05	2.4e-06	1.4e-08	6.2e-08	7.6e-06	1.5e-05
Tc-97m	1.8e-06	1.1e-08	4.8e-08	5.8e-06	1.2e-05	3.6e-07	2.2e-09	9.6e-09	1.1e-06	2.3e-06
Tc-99	1.7e-07	1.0e-09	4.4e-09	5.3e-07	1.1e-06	3.3e-08	2.0e-10	8.7e-10	1.1e-07	2.2e-07
Ru-103	6.3e-05	3.6e-07	1.7e-06	2.0e-04	4.0e-04	1.2e-05	7.2e-08	3.4e-07	3.9e-05	8.0e-05
Ru-106	4.9e-04	3.0e-06	1.3e-05	1.6e-03	3.2e-03	9.7e-05	6.1e-07	2.6e-06	3.1e-04	6.2e-04
Ag-108m	5.0e-03	2.2e-04	1.2e-03	1.3e-02	2.5e-02	9.9e-04	4.3e-05	2.3e-04	2.5e-03	5.1e-03
Ag-110m	3.7e-03	1.6e-04	8.7e-04	9.3e-03	1.9e-02	7.3e-04	3.2e-05	1.7e-04	1.8e-03	3.8e-03
Cd-109	5.0e-03	2.1e-05	8.1e-05	1.9e-02	3.2e-02	9.9e-04	4.1e-06	1.6e-05	3.8e-03	6.5e-03
Sn-113	2.9e-04	8.7e-07	3.9e-06	1.1e-03	1.8e-03	5.7e-05	1.8e-07	7.7e-07	2.1e-04	3.7e-04
Sb-124	5.5e-02	2.1e-05	1.1e-04	2.1e-01	3.6e-01	1.1e-02	4.2e-06	2.3e-05	4.2e-02	7.1e-02
Sb-125	1.1e-01	4.2e-05	2.2e-04	4.2e-01	7.0e-01	2.1e-02	8.2e-06	4.3e-05	8.2e-02	1.4e-01
Te-123m	6.2e-03	3.9e-05	1.6e-04	2.4e-02	4.0e-02	1.2e-03	7.9e-06	3.1e-05	4.7e-03	7.9e-03
Te-127m	7.9e-04	5.0e-06	2.0e-05	3.1e-03	5.1e-03	1.6e-04	1.0e-06	4.0e-06	5.9e-04	1.0e-03
I-125	8.0e-03	1.8e-03	6.9e-03	1.5e-02	1.8e-02	1.6e-03	3.6e-04	1.4e-03	2.9e-03	3.5e-03
I-129	4.9e-02	1.1e-02	4.3e-02	9.0e-02	1.1e-01	9.7e-03	2.3e-03	8.5e-03	1.8e-02	2.1e-02
I-131	2.4e-03	1.4e-04	1.3e-03	6.1e-03	8.5e-03	4.7e-04	2.8e-05	2.5e-04	1.2e-03	1.7e-03
Cs-134	2.8e-01	1.5e-03	5.8e-03	1.1e+00	1.8e+00	5.5e-02	2.9e-04	1.1e-03	2.1e-01	3.5e-01
Cs-135	6.9e-06	3.6e-08	1.4e-07	2.6e-05	4.4e-05	1.4e-06	7.2e-09	2.8e-08	5.2e-06	8.7e-06
Cs-137	1.4e-01	7.2e-04	2.8e-03	5.2e-01	8.9e-01	2.7e-02	1.4e-04	5.6e-04	1.0e-01	1.7e-01
Ba-133	5.8e-03	2.1e-05	9.4e-05	2.1e-02	3.7e-02	1.1e-03	4.3e-06	1.9e-05	4.3e-03	7.5e-03
Ce-139	6.2e-04	2.3e-06	1.0e-05	2.3e-03	4.0e-03	1.2e-04	4.6e-07	2.0e-06	4.6e-04	7.8e-04
Ce-141	4.7e-05	1.6e-07	7.9e-07	1.7e-04	3.0e-04	9.3e-06	3.2e-08	1.5e-07	3.3e-05	6.1e-05
Ce-144	1.4e-03	5.3e-06	2.3e-05	5.3e-03	9.1e-03	2.8e-04	1.1e-06	4.5e-06	1.0e-03	1.8e-03
Pm-147	3.7e-07	1.4e-09	5.9e-09	1.4e-06	2.3e-06	7.2e-08	2.7e-10	1.2e-09	2.7e-07	4.6e-07

Table F2.27 Normalized effective doses from external exposure: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.8e-08	2.2e-10	9.5e-10	2.2e-07	3.7e-07	1.1e-08	4.4e-11	1.8e-10	4.3e-08	7.4e-08
Eu-152	1.7e-02	6.4e-05	2.7e-04	6.4e-02	1.1e-01	3.3e-03	1.3e-05	5.3e-05	1.3e-02	2.1e-02
Eu-154	1.8e-02	6.8e-05	2.9e-04	6.9e-02	1.2e-01	3.6e-03	1.4e-05	5.7e-05	1.4e-02	2.3e-02
Eu-155	7.8e-04	3.0e-06	1.3e-05	3.0e-03	5.0e-03	1.5e-04	6.0e-07	2.5e-06	6.0e-04	9.8e-04
Gd-153	6.5e-04	2.4e-06	1.1e-05	2.5e-03	4.2e-03	1.3e-04	4.8e-07	2.1e-06	4.8e-04	8.4e-04
Tb-160	2.2e-03	8.1e-06	3.6e-05	8.1e-03	1.4e-02	4.3e-04	1.6e-06	7.1e-06	1.6e-03	2.7e-03
Tm-170	1.1e-04	4.1e-07	1.7e-06	4.0e-04	6.9e-04	2.1e-05	8.0e-08	3.4e-07	7.9e-05	1.4e-04
Tm-171	6.6e-06	2.5e-08	1.1e-07	2.5e-05	4.3e-05	1.3e-06	5.0e-09	2.1e-08	4.9e-06	8.5e-06
Ta-182	4.2e-03	1.6e-05	7.0e-05	1.6e-02	2.8e-02	8.3e-04	3.1e-06	1.4e-05	3.1e-03	5.5e-03
W-181	2.1e-05	1.2e-07	5.5e-07	6.3e-05	1.3e-04	4.1e-06	2.4e-08	1.1e-07	1.3e-05	2.6e-05
W-185	5.9e-08	3.4e-10	1.6e-09	1.8e-07	3.9e-07	1.2e-08	6.8e-11	3.1e-10	3.6e-08	7.6e-08
Os-185	3.8e-02	1.5e-04	6.2e-04	1.5e-01	2.5e-01	7.6e-03	3.1e-05	1.2e-04	2.9e-02	5.0e-02
Ir-192	2.6e-04	1.5e-06	7.0e-06	8.4e-04	1.7e-03	5.2e-05	3.0e-07	1.4e-06	1.7e-04	3.3e-04
Tl-204	2.9e-03	1.2e-05	4.7e-05	1.1e-02	1.9e-02	5.7e-04	2.4e-06	9.3e-06	2.2e-03	3.8e-03
Pb-210	1.2e-02	4.8e-05	1.9e-04	4.4e-02	7.5e-02	2.3e-03	9.5e-06	3.7e-05	8.9e-03	1.5e-02
Bi-207	4.6e-01	1.9e-03	7.4e-03	1.8e+00	3.0e+00	9.1e-02	3.7e-04	1.5e-03	3.5e-01	5.9e-01
Po-210	7.1e-07	2.8e-09	1.1e-08	2.7e-06	4.6e-06	1.4e-07	5.6e-10	2.2e-09	5.4e-07	9.2e-07
Ra-226	2.8e-02	1.0e-04	4.5e-04	1.0e-01	1.8e-01	5.4e-03	2.1e-05	8.9e-05	2.1e-02	3.5e-02
Ra-228	1.4e-02	5.2e-05	2.3e-04	5.2e-02	8.9e-02	2.7e-03	1.0e-05	4.5e-05	1.0e-02	1.8e-02
Ac-227	7.4e-03	2.8e-05	1.2e-04	2.8e-02	4.7e-02	1.5e-03	5.6e-06	2.4e-05	5.6e-03	9.3e-03
Th-228	1.7e-02	6.5e-05	2.8e-04	6.5e-02	1.1e-01	3.4e-03	1.3e-05	5.5e-05	1.3e-02	2.2e-02
Th-229	5.7e-03	2.2e-05	9.2e-05	2.1e-02	3.6e-02	1.1e-03	4.3e-06	1.8e-05	4.2e-03	7.2e-03
Th-230	1.1e-05	4.0e-08	1.7e-07	4.0e-05	6.7e-05	2.1e-06	8.0e-09	3.3e-08	7.8e-06	1.3e-05
Th-232	7.5e-06	2.8e-08	1.2e-07	2.8e-05	4.8e-05	1.5e-06	5.7e-09	2.4e-08	5.6e-06	9.5e-06
Pa-231	6.2e-04	2.3e-06	1.0e-05	2.4e-03	4.0e-03	1.2e-04	4.6e-07	2.0e-06	4.7e-04	8.0e-04
U-232	1.3e-05	5.0e-08	2.1e-07	5.0e-05	8.5e-05	2.6e-06	1.0e-08	4.2e-08	1.0e-05	1.7e-05
U-233	9.9e-06	3.7e-08	1.6e-07	3.8e-05	6.4e-05	1.9e-06	7.5e-09	3.2e-08	7.5e-06	1.3e-05
U-234	9.6e-06	3.7e-08	1.6e-07	3.7e-05	6.2e-05	1.9e-06	7.3e-09	3.1e-08	7.3e-06	1.2e-05
U-235	2.6e-03	9.7e-06	4.2e-05	9.7e-03	1.7e-02	5.1e-04	1.9e-06	8.2e-06	1.9e-03	3.3e-03
U-236	8.3e-06	3.1e-08	1.3e-07	3.2e-05	5.4e-05	1.6e-06	6.3e-09	2.7e-08	6.3e-06	1.1e-05
U-238	2.0e-03	7.4e-06	3.2e-05	7.4e-03	1.3e-02	3.9e-04	1.5e-06	6.3e-06	1.5e-03	2.5e-03
Np-237	3.5e-03	1.3e-05	5.6e-05	1.3e-02	2.2e-02	6.8e-04	2.6e-06	1.1e-05	2.6e-03	4.4e-03
Pu-236	9.7e-06	3.7e-08	1.6e-07	3.7e-05	6.2e-05	1.9e-06	7.4e-09	3.1e-08	7.3e-06	1.2e-05
Pu-238	1.0e-05	3.9e-08	1.7e-07	3.9e-05	6.5e-05	2.0e-06	7.8e-09	3.3e-08	7.6e-06	1.3e-05
Pu-239	4.7e-06	1.8e-08	7.6e-08	1.8e-05	3.0e-05	9.2e-07	3.5e-09	1.5e-08	3.5e-06	5.9e-06
Pu-240	9.9e-06	3.8e-08	1.6e-07	3.7e-05	6.3e-05	1.9e-06	7.5e-09	3.2e-08	7.4e-06	1.3e-05
Pu-241	2.7e-08	1.0e-10	4.4e-10	1.0e-07	1.7e-07	5.3e-09	2.1e-11	8.7e-11	2.0e-08	3.4e-08
Pu-242	8.2e-06	3.1e-08	1.3e-07	3.1e-05	5.2e-05	1.6e-06	6.2e-09	2.6e-08	6.1e-06	1.0e-05
Pu-244	6.4e-03	2.4e-05	1.0e-04	2.4e-02	4.1e-02	1.3e-03	4.9e-06	2.1e-05	4.8e-03	8.2e-03
Am-241	3.8e-04	1.4e-06	6.2e-06	1.5e-03	2.4e-03	7.6e-05	2.9e-07	1.2e-06	2.9e-04	4.8e-04
Am-242m	3.5e-04	1.3e-06	5.7e-06	1.4e-03	2.2e-03	6.9e-05	2.6e-07	1.1e-06	2.7e-04	4.4e-04
Am-243	3.3e-03	1.3e-05	5.4e-05	1.3e-02	2.1e-02	6.6e-04	2.5e-06	1.1e-05	2.6e-03	4.2e-03
Cm-242	3.6e-06	1.4e-08	5.8e-08	1.3e-05	2.4e-05	7.1e-07	2.7e-09	1.1e-08	2.6e-06	4.6e-06
Cm-243	1.9e-03	7.2e-06	3.1e-05	7.1e-03	1.2e-02	3.7e-04	1.4e-06	6.1e-06	1.4e-03	2.4e-03
Cm-244	1.0e-05	3.9e-08	1.7e-07	3.8e-05	6.7e-05	2.0e-06	7.7e-09	3.3e-08	7.6e-06	1.3e-05
Cm-245	1.3e-03	5.0e-06	2.1e-05	4.9e-03	8.7e-03	2.6e-04	1.0e-06	4.2e-06	9.9e-04	1.7e-03
Cm-246	9.5e-06	3.6e-08	1.5e-07	3.5e-05	6.2e-05	1.9e-06	7.1e-09	3.0e-08	7.1e-06	1.2e-05
Cm-247	5.3e-03	2.0e-05	8.6e-05	2.0e-02	3.5e-02	1.0e-03	4.0e-06	1.7e-05	3.9e-03	6.8e-03
Cm-248	7.2e-06	2.7e-08	1.2e-07	2.7e-05	4.7e-05	1.4e-06	5.5e-09	2.3e-08	5.4e-06	9.3e-06
Bk-249	4.6e-08	1.7e-10	7.4e-10	1.7e-07	2.9e-07	9.1e-09	3.5e-11	1.5e-10	3.4e-08	5.8e-08
Cf-248	4.9e-06	1.8e-08	7.9e-08	1.8e-05	3.2e-05	9.7e-07	3.7e-09	1.5e-08	3.6e-06	6.4e-06
Cf-249	5.2e-03	1.9e-05	8.3e-05	2.0e-02	3.4e-02	1.0e-03	4.0e-06	1.6e-05	3.9e-03	6.8e-03
Cf-250	8.4e-06	3.1e-08	1.3e-07	3.2e-05	5.5e-05	1.7e-06	6.4e-09	2.7e-08	6.3e-06	1.1e-05
Cf-251	1.9e-03	6.9e-06	3.0e-05	7.1e-03	1.2e-02	3.7e-04	1.4e-06	5.9e-06	1.4e-03	2.4e-03
Cf-252	6.9e-06	2.5e-08	1.1e-07	2.6e-05	4.5e-05	1.4e-06	5.2e-09	2.2e-08	5.1e-06	8.9e-06
Cf-254	2.9e-09	1.0e-11	4.7e-11	1.1e-08	1.9e-08	5.7e-10	2.1e-12	9.2e-12	2.1e-09	3.8e-09
Es-254	6.5e-03	2.5e-05	1.1e-04	2.5e-02	4.2e-02	1.3e-03	5.0e-06	2.1e-05	4.9e-03	8.3e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.28 Normalized effective doses from inhalation: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.1e-04	4.1e-05	9.9e-05	1.8e-04	2.1e-04	2.1e-05	8.2e-06	2.0e-05	3.5e-05	4.1e-05
C-14	1.3e-05	2.5e-08	1.1e-05	2.9e-05	3.6e-05	2.6e-06	4.9e-09	2.2e-06	5.8e-06	7.2e-06
Na-22	4.6e-04	1.4e-06	4.7e-06	1.8e-03	3.0e-03	9.2e-05	2.9e-07	9.3e-07	3.6e-04	5.9e-04
P-32	3.4e-06	8.1e-09	5.5e-08	1.1e-05	2.1e-05	6.7e-07	1.6e-09	1.1e-08	2.1e-06	4.1e-06
S-35	1.4e-05	5.6e-08	2.3e-07	5.4e-05	9.1e-05	2.8e-06	1.1e-08	4.5e-08	1.1e-05	1.8e-05
Cl-36	2.5e-02	7.2e-03	2.2e-02	4.4e-02	5.2e-02	4.9e-03	1.5e-03	4.3e-03	8.6e-03	1.0e-02
K-40	7.7e-04	2.5e-06	7.9e-06	3.1e-03	4.9e-03	1.5e-04	4.9e-07	1.6e-06	6.1e-04	9.7e-04
Ca-41	4.1e-06	1.8e-08	6.5e-08	1.6e-05	2.7e-05	8.1e-07	3.7e-09	1.3e-08	3.2e-06	5.3e-06
Ca-45	5.5e-05	2.3e-07	8.6e-07	2.1e-04	3.5e-04	1.1e-05	4.7e-08	1.7e-07	4.2e-05	7.0e-05
Sc-46	1.1e-04	4.7e-07	1.8e-06	4.3e-04	7.1e-04	2.2e-05	9.4e-08	3.5e-07	8.5e-05	1.4e-04
Cr-51	6.6e-08	6.5e-10	3.1e-09	2.0e-07	4.2e-07	1.3e-08	1.3e-10	6.0e-10	4.0e-08	8.1e-08
Mn-53	2.0e-07	4.3e-09	1.4e-08	6.4e-07	1.3e-06	4.0e-08	8.6e-10	2.7e-09	1.3e-07	2.6e-07
Mn-54	5.3e-06	1.1e-07	3.6e-07	1.7e-05	3.4e-05	1.1e-06	2.2e-08	7.1e-08	3.2e-06	6.7e-06
Fe-55	1.3e-06	9.3e-09	3.4e-08	4.3e-06	8.8e-06	2.6e-07	1.9e-09	6.8e-09	8.6e-07	1.7e-06
Fe-59	7.7e-06	4.9e-08	2.0e-07	2.4e-05	4.9e-05	1.5e-06	9.7e-09	4.0e-08	4.9e-06	9.9e-06
Co-56	1.7e-05	1.1e-07	4.4e-07	5.5e-05	1.1e-04	3.4e-06	2.2e-08	8.6e-08	1.1e-05	2.1e-05
Co-57	3.1e-06	2.1e-08	8.0e-08	1.0e-05	2.0e-05	6.1e-07	4.1e-09	1.6e-08	2.0e-06	3.9e-06
Co-58	5.2e-06	3.4e-08	1.4e-07	1.7e-05	3.3e-05	1.0e-06	6.7e-09	2.7e-08	3.4e-06	6.6e-06
Co-60	1.1e-04	7.2e-07	2.7e-06	3.5e-04	6.8e-04	2.1e-05	1.4e-07	5.3e-07	6.9e-05	1.3e-04
Ni-59	4.9e-07	3.4e-09	1.3e-08	1.6e-06	3.3e-06	9.7e-08	6.9e-10	2.5e-09	3.2e-07	6.5e-07
Ni-63	1.7e-06	1.2e-08	4.2e-08	5.4e-06	1.1e-05	3.3e-07	2.3e-09	8.3e-09	1.1e-06	2.2e-06
Zn-65	1.2e-03	5.4e-06	1.8e-05	4.9e-03	7.8e-03	2.4e-04	1.1e-06	3.5e-06	9.7e-04	1.5e-03
As-73	1.3e-04	4.4e-07	1.8e-06	4.7e-04	8.2e-04	2.5e-05	9.0e-08	3.5e-07	9.4e-05	1.6e-04
Se-75	8.3e-05	2.4e-08	8.1e-08	2.1e-04	3.5e-04	1.2e-05	4.9e-07	1.6e-06	4.2e-05	6.7e-05
Sr-85	6.4e-06	2.6e-08	1.0e-07	2.4e-05	4.0e-05	1.3e-06	5.3e-09	2.0e-08	4.8e-06	8.1e-06
Sr-89	1.5e-05	6.1e-08	2.4e-07	5.6e-05	9.5e-05	3.0e-06	1.2e-08	4.8e-08	1.1e-05	1.9e-05
Sr-90	6.1e-04	2.7e-06	9.6e-06	2.4e-03	3.8e-03	1.2e-04	5.4e-07	1.9e-06	4.7e-04	7.7e-04
Y-91	1.3e-04	5.5e-07	2.1e-06	5.1e-04	8.5e-04	2.6e-05	1.1e-07	4.2e-07	1.0e-04	1.7e-04
Zr-93	2.3e-04	1.0e-06	3.6e-06	8.9e-04	1.4e-03	4.5e-05	2.0e-07	7.1e-07	1.8e-04	2.8e-04
Zr-95	7.2e-06	3.0e-07	1.2e-06	2.8e-04	4.5e-04	1.4e-05	6.1e-08	2.3e-07	5.5e-05	8.9e-05
Nb-93m	3.8e-05	1.7e-07	5.9e-07	1.5e-04	2.4e-04	7.5e-06	3.3e-08	1.2e-07	3.0e-05	4.8e-05
Nb-94	1.1e-03	4.8e-06	1.7e-05	4.2e-03	6.9e-03	2.1e-04	9.5e-07	3.3e-06	8.4e-04	1.4e-03
Nb-95	2.0e-05	7.9e-08	3.3e-07	7.6e-05	1.3e-04	4.0e-06	1.6e-08	6.4e-08	1.5e-05	2.6e-05
Mo-93	8.3e-06	5.8e-08	2.1e-07	2.8e-05	5.3e-05	1.6e-06	1.2e-08	4.2e-08	5.6e-06	1.1e-05
Tc-97	7.9e-07	5.5e-09	2.1e-08	2.7e-06	5.2e-06	1.6e-07	1.1e-09	4.0e-09	5.2e-07	1.0e-06
Tc-97m	8.7e-06	5.7e-08	2.3e-07	2.9e-05	5.5e-05	1.7e-06	1.2e-08	4.5e-08	5.7e-06	1.1e-05
Tc-99	1.5e-05	1.0e-07	3.8e-07	5.0e-05	9.6e-05	2.9e-06	2.0e-08	7.5e-08	9.7e-06	1.9e-05
Ru-103	5.8e-06	3.6e-08	1.5e-07	1.8e-05	3.7e-05	1.1e-06	7.3e-09	3.1e-08	3.7e-06	7.3e-06
Ru-106	2.1e-04	1.5e-06	5.5e-06	6.9e-04	1.3e-03	4.1e-05	2.9e-07	1.1e-06	1.4e-04	2.7e-04
Ag-108m	2.9e-05	1.5e-06	6.7e-06	7.7e-05	1.5e-04	5.6e-06	3.0e-07	1.3e-06	1.5e-05	3.0e-05
Ag-110m	2.3e-05	1.1e-06	5.4e-06	6.1e-05	1.2e-04	4.5e-06	2.3e-07	1.1e-06	1.2e-05	2.4e-05
Cd-109	2.6e-03	1.2e-05	4.1e-05	1.0e-02	1.7e-02	5.2e-04	2.5e-06	8.0e-06	2.1e-03	3.3e-03
Sn-113	1.5e-05	5.1e-08	2.0e-07	5.6e-05	9.3e-05	2.9e-06	1.0e-08	3.9e-08	1.1e-05	1.8e-05
Sb-124	1.9e-03	8.1e-07	3.8e-06	7.5e-03	1.2e-02	3.8e-04	1.6e-07	7.5e-07	1.5e-03	2.4e-03
Sb-125	2.3e-03	1.0e-06	4.7e-06	9.5e-03	1.5e-02	4.6e-04	2.1e-07	9.2e-07	1.9e-03	3.0e-03
Te-123m	9.2e-04	6.7e-06	2.3e-05	3.6e-03	5.8e-03	1.8e-04	1.4e-06	4.4e-06	7.2e-04	1.2e-03
Te-127m	1.7e-03	1.2e-05	4.2e-05	6.7e-03	1.1e-02	3.4e-04	2.5e-06	8.3e-06	1.3e-03	2.1e-03
I-125	1.3e-02	3.5e-03	1.1e-02	2.3e-02	2.9e-02	2.5e-03	7.0e-04	2.2e-03	4.6e-03	5.6e-03
I-129	1.3e-01	3.9e-02	1.2e-01	2.3e-01	2.8e-01	2.6e-02	7.8e-03	2.3e-02	4.6e-02	5.5e-02
I-131	3.6e-03	2.3e-04	1.9e-03	9.2e-03	1.2e-02	7.0e-04	4.6e-05	3.7e-04	1.8e-03	2.4e-03
Cs-134	2.4e-03	1.5e-05	4.8e-05	9.6e-03	1.5e-02	4.8e-04	3.0e-06	9.4e-06	1.9e-03	3.0e-03
Cs-135	2.6e-04	1.6e-06	5.2e-06	1.0e-03	1.7e-03	5.2e-05	3.3e-07	1.0e-06	2.1e-04	3.3e-04
Cs-137	1.8e-03	1.1e-05	3.5e-05	7.0e-03	1.1e-02	3.5e-04	2.2e-06	6.9e-06	1.4e-03	2.2e-03
Ba-133	3.6e-05	1.6e-07	5.6e-07	1.4e-04	2.3e-04	7.0e-06	3.2e-08	1.1e-07	2.7e-05	4.5e-05
Ce-139	3.5e-05	1.5e-07	5.5e-07	1.3e-04	2.2e-04	6.9e-06	3.1e-08	1.1e-07	2.7e-05	4.3e-05
Ce-141	4.4e-05	1.7e-07	7.1e-07	1.6e-04	2.7e-04	8.6e-06	3.3e-08	1.4e-07	3.2e-05	5.4e-05
Ce-144	1.0e-03	4.6e-06	1.7e-05	4.1e-03	6.5e-03	2.1e-04	9.2e-07	3.3e-06	8.0e-04	1.3e-03
Pm-147	1.1e-04	4.7e-07	1.7e-06	4.1e-04	6.7e-04	2.1e-05	9.4e-08	3.3e-07	8.1e-05	1.3e-04

Table F2.28 Normalized effective doses from inhalation: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.9e-05	3.9e-07	1.4e-06	3.4e-04	5.5e-04	1.7e-05	7.8e-08	2.7e-07	6.7e-05	1.1e-04
Eu-152	9.3e-04	4.1e-06	1.5e-05	3.7e-03	6.0e-03	1.8e-04	8.1e-07	2.9e-06	7.2e-04	1.2e-03
Eu-154	1.2e-03	5.2e-06	1.9e-05	4.7e-03	7.6e-03	2.3e-04	1.0e-06	3.6e-06	9.2e-04	1.5e-03
Eu-155	1.5e-04	6.6e-07	2.4e-06	6.0e-04	9.8e-04	3.0e-05	1.3e-07	4.7e-07	1.2e-04	2.0e-04
Gd-153	4.0e-05	1.7e-07	6.3e-07	1.6e-04	2.6e-04	7.9e-06	3.5e-08	1.2e-07	3.1e-05	5.0e-05
Tb-160	1.1e-04	4.6e-07	1.8e-06	4.3e-04	7.1e-04	2.2e-05	9.3e-08	3.5e-07	8.5e-05	1.4e-04
Tm-170	1.3e-04	5.4e-07	2.0e-06	4.9e-04	8.0e-04	2.5e-05	1.1e-07	3.9e-07	9.7e-05	1.6e-04
Tm-171	3.0e-05	1.3e-07	4.6e-07	1.2e-04	1.8e-04	5.9e-06	2.6e-08	9.1e-08	2.3e-05	3.7e-05
Ta-182	1.8e-04	7.8e-07	2.9e-06	7.0e-04	1.2e-03	3.6e-05	1.6e-07	5.7e-07	1.4e-04	2.3e-04
W-181	8.2e-08	5.6e-10	2.2e-09	2.8e-07	5.4e-07	1.6e-08	1.1e-10	4.3e-10	5.4e-08	1.1e-07
W-185	3.7e-07	2.5e-09	9.8e-09	1.2e-06	2.4e-06	7.3e-08	4.9e-10	1.9e-09	2.4e-07	4.8e-07
Os-185	5.3e-04	2.4e-06	8.3e-06	2.1e-03	3.4e-03	1.1e-04	4.9e-07	1.6e-06	4.2e-04	6.7e-04
Ir-192	1.6e-05	1.1e-07	4.4e-07	5.6e-05	1.1e-04	3.3e-06	2.1e-08	8.6e-08	1.1e-05	2.2e-05
Tl-204	2.0e-04	9.7e-07	3.1e-06	8.0e-04	1.3e-03	3.9e-05	2.0e-07	6.1e-07	1.6e-04	2.5e-04
Pb-210	1.5e+00	7.1e-03	2.3e-02	5.9e+00	9.3e+00	2.9e-01	1.4e-03	4.5e-03	1.2e+00	1.8e+00
Bi-207	2.4e-03	1.2e-05	3.7e-05	9.8e-03	1.6e-02	4.8e-04	2.4e-06	7.4e-06	1.9e-03	3.1e-03
Po-210	1.2e+00	5.3e-03	1.8e-02	4.7e+00	7.6e+00	2.4e-01	1.1e-03	3.5e-03	9.3e-01	1.5e+00
Ra-226	7.7e-02	3.5e-04	1.2e-03	3.0e-01	4.8e-01	1.5e-02	6.9e-05	2.4e-04	5.9e-02	9.6e-02
Ra-228	6.1e-02	2.7e-04	9.6e-04	2.4e-01	3.9e-01	1.2e-02	5.5e-05	1.9e-04	4.7e-02	7.6e-02
Ac-227	1.9e+00	8.5e-03	2.9e-02	7.4e+00	1.2e+01	3.7e-01	1.7e-03	5.8e-03	1.5e+00	2.4e+00
Th-228	9.5e-01	4.1e-03	1.5e-02	3.7e+00	6.0e+00	1.9e-01	8.3e-04	2.9e-03	7.3e-01	1.2e+00
Th-229	1.8e+00	8.1e-03	2.9e-02	7.2e+00	1.2e+01	3.6e-01	1.6e-03	5.6e-03	1.4e+00	2.3e+00
Th-230	3.1e-01	1.4e-03	4.9e-03	1.2e+00	2.0e+00	6.2e-02	2.8e-04	9.6e-04	2.4e-01	3.9e-01
Th-232	5.5e-01	2.4e-03	8.6e-03	2.2e+00	3.5e+00	1.1e-01	4.9e-04	1.7e-03	4.3e-01	6.9e-01
Pa-231	7.7e-01	3.4e-03	1.2e-02	3.0e+00	4.9e+00	1.5e-01	6.8e-04	2.4e-03	6.0e-01	9.8e-01
U-232	6.4e-01	3.8e-03	1.3e-02	3.3e+00	5.3e+00	1.7e-01	7.5e-04	2.6e-03	6.6e-01	1.1e+00
U-233	2.1e-01	9.3e-04	3.3e-03	8.2e-01	1.3e+00	4.1e-02	1.9e-04	6.5e-04	1.6e-01	2.6e-01
U-234	2.1e-01	9.1e-04	3.2e-03	8.0e-01	1.3e+00	4.0e-02	1.8e-04	6.4e-04	1.6e-01	2.6e-01
U-235	1.9e-01	8.3e-04	2.9e-03	7.2e-01	1.2e+00	3.7e-02	1.7e-04	5.8e-04	1.5e-01	2.3e-01
U-236	1.9e-01	8.5e-04	3.0e-03	7.4e-01	1.2e+00	3.8e-02	1.7e-04	5.9e-04	1.5e-01	2.4e-01
U-238	1.8e-01	7.8e-04	2.8e-03	6.9e-01	1.1e+00	3.5e-02	1.6e-04	5.5e-04	1.4e-01	2.2e-01
Np-237	5.0e-01	2.2e-03	7.9e-03	1.9e+00	3.2e+00	9.8e-02	4.5e-04	1.6e-03	3.8e-01	6.3e-01
Pu-236	2.2e-01	9.6e-04	3.5e-03	8.6e-01	1.4e+00	4.4e-02	2.0e-04	6.8e-04	1.7e-01	2.8e-01
Pu-238	3.6e-01	1.6e-03	5.6e-03	1.4e+00	2.3e+00	7.1e-02	3.2e-04	1.1e-03	2.7e-01	4.6e-01
Pu-239	3.6e-01	1.6e-03	5.6e-03	1.4e+00	2.3e+00	7.1e-02	3.2e-04	1.1e-03	2.7e-01	4.6e-01
Pu-240	3.6e-01	1.6e-03	5.6e-03	1.4e+00	2.3e+00	7.1e-02	3.2e-04	1.1e-03	2.7e-01	4.6e-01
Pu-241	3.8e-03	1.7e-05	6.0e-05	1.5e-02	2.4e-02	7.5e-04	3.4e-06	1.2e-05	2.9e-03	4.8e-03
Pu-242	3.3e-01	1.5e-03	5.3e-03	1.3e+00	2.1e+00	6.6e-02	3.0e-04	1.0e-03	2.6e-01	4.3e-01
Pu-244	3.1e-01	1.4e-03	4.9e-03	1.2e+00	2.0e+00	6.1e-02	2.7e-04	9.6e-04	2.4e-01	4.0e-01
Am-241	9.3e-01	4.2e-03	1.5e-02	3.7e+00	6.0e+00	1.8e-01	8.3e-04	2.9e-03	7.3e-01	1.2e+00
Am-242m	9.1e-01	4.1e-03	1.4e-02	3.6e+00	5.8e+00	1.8e-01	8.1e-04	2.8e-03	7.1e-01	1.1e+00
Am-243	9.3e-01	4.2e-03	1.5e-02	3.7e+00	6.0e+00	1.8e-01	8.3e-04	2.9e-03	7.3e-01	1.2e+00
Cm-242	9.6e-02	4.1e-04	1.5e-03	3.7e-01	6.2e-01	1.9e-02	8.2e-05	3.0e-04	7.3e-02	1.2e-01
Cm-243	6.9e-01	3.1e-03	1.1e-02	2.7e+00	4.5e+00	1.4e-01	6.1e-04	2.1e-03	5.3e-01	8.8e-01
Cm-244	5.9e-01	2.6e-03	9.3e-03	2.3e+00	3.9e+00	1.2e-01	5.3e-04	1.8e-03	4.6e-01	7.6e-01
Cm-245	9.5e-01	4.2e-03	1.5e-02	3.7e+00	6.2e+00	1.9e-01	8.5e-04	3.0e-03	7.4e-01	1.2e+00
Cm-246	9.5e-01	4.2e-03	1.5e-02	3.7e+00	6.2e+00	1.9e-01	8.5e-04	3.0e-03	7.4e-01	1.2e+00
Cm-247	8.6e-01	3.8e-03	1.3e-02	3.4e+00	5.6e+00	1.7e-01	7.6e-04	2.7e-03	6.6e-01	1.1e+00
Cm-248	3.3e+00	1.5e-02	5.2e-02	1.3e+01	2.2e+01	6.6e-01	3.0e-03	1.0e-02	2.6e+00	4.3e+00
Bk-249	3.3e-03	1.4e-05	5.1e-05	1.3e-02	2.1e-02	6.5e-04	2.8e-06	1.0e-05	2.5e-03	4.1e-03
Cf-248	1.8e-01	7.7e-04	2.8e-03	6.9e-01	1.1e+00	3.6e-02	1.6e-04	5.4e-04	1.4e-01	2.3e-01
Cf-249	1.6e+00	7.0e-03	2.4e-02	6.1e+00	1.0e+01	3.2e-01	1.4e-03	4.8e-03	1.2e+00	2.0e+00
Cf-250	7.7e-01	3.4e-03	1.2e-02	2.9e+00	4.9e+00	1.5e-01	6.7e-04	2.3e-03	5.8e-01	9.8e-01
Cf-251	1.6e+00	7.1e-03	2.5e-02	6.2e+00	1.0e+01	3.2e-01	1.4e-03	4.9e-03	1.2e+00	2.1e+00
Cf-252	4.2e-01	1.8e-03	6.4e-03	1.6e+00	2.7e+00	8.3e-02	3.7e-04	1.3e-03	3.2e-01	5.3e-01
Cf-254	6.0e-01	2.4e-03	9.3e-03	2.3e+00	3.8e+00	1.2e-01	4.8e-04	1.8e-03	4.5e-01	7.4e-01
Es-254	1.7e-01	7.5e-04	2.7e-03	6.7e-01	1.1e+00	3.3e-02	1.5e-04	5.3e-04	1.3e-01	2.1e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.29 Normalized effective doses from ingestion: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	1.1e-04	2.9e-05	8.4e-05	2.0e-04	2.6e-04	2.1e-05	5.9e-06	1.7e-05	3.9e-05	5.1e-05
C-14	1.1e-04	1.6e-07	7.2e-05	2.4e-04	3.4e-04	2.1e-05	3.2e-08	1.4e-05	4.7e-05	6.6e-05
Na-22	2.2e-02	8.6e-05	2.3e-04	8.4e-02	1.4e-01	4.3e-03	1.3e-05	4.5e-05	1.7e-02	2.8e-02
P-32	4.9e-05	1.1e-07	8.0e-07	1.5e-04	3.0e-04	9.8e-06	2.2e-08	1.6e-07	2.9e-05	6.0e-05
S-35	6.2e-05	1.2e-07	8.6e-07	1.7e-04	3.3e-04	1.2e-05	2.3e-08	1.7e-07	3.3e-05	6.6e-05
Cl-36	1.5e+00	1.1e-01	7.1e-01	3.6e+00	5.5e+00	3.0e-01	2.1e-02	1.4e-01	6.9e-01	1.1e+00
K-40	2.2e-02	6.7e-05	2.3e-04	8.0e-02	1.3e-01	4.4e-03	1.3e-05	4.5e-05	1.6e-02	2.6e-02
Ca-41	5.2e-05	1.9e-07	7.6e-07	1.7e-04	3.0e-04	1.0e-05	3.8e-08	1.5e-07	3.3e-05	5.9e-05
Ca-45	8.9e-05	3.2e-07	1.1e-06	2.6e-04	4.3e-04	1.4e-05	6.5e-08	2.1e-07	5.0e-05	8.5e-05
Sc-46	9.6e-05	4.6e-07	1.5e-06	3.7e-04	6.1e-04	1.9e-05	9.1e-08	3.0e-07	7.3e-05	1.2e-04
Cr-51	2.4e-07	2.6e-09	1.1e-08	7.3e-07	1.5e-06	4.7e-08	5.2e-10	2.2e-09	1.5e-07	2.9e-07
Mn-53	5.3e-07	1.2e-08	3.7e-08	1.6e-06	3.3e-06	1.0e-07	2.4e-09	7.3e-09	3.2e-07	6.3e-07
Mn-54	9.1e-06	2.2e-07	6.4e-07	2.9e-05	5.7e-05	1.8e-06	4.5e-08	1.2e-07	5.8e-06	1.1e-05
Fe-55	7.0e-06	5.2e-08	1.8e-07	2.3e-05	4.7e-05	1.4e-06	1.0e-08	3.7e-08	4.5e-06	9.1e-06
Fe-59	1.6e-05	1.1e-07	4.4e-07	5.1e-05	1.0e-04	3.2e-06	2.3e-08	8.6e-08	9.9e-06	2.0e-05
Co-56	4.4e-05	2.4e-07	1.1e-06	1.3e-04	2.6e-04	8.7e-06	4.9e-08	2.2e-07	2.5e-05	5.0e-05
Co-57	5.6e-06	3.1e-08	1.4e-07	1.6e-05	3.2e-05	1.1e-06	6.2e-09	2.7e-08	3.2e-06	6.4e-06
Co-58	1.2e-05	6.8e-08	3.0e-07	3.5e-05	7.1e-05	2.4e-06	1.4e-08	6.0e-08	6.9e-06	1.4e-05
Co-60	1.1e-04	6.0e-07	2.6e-06	3.0e-04	6.2e-04	2.1e-05	1.2e-07	5.2e-07	6.1e-05	1.2e-04
Ni-59	1.8e-06	1.2e-08	4.6e-08	5.3e-06	1.1e-05	3.6e-07	2.4e-09	9.0e-09	1.1e-06	2.2e-06
Ni-63	4.3e-06	2.8e-08	1.1e-07	1.3e-05	2.7e-05	8.5e-07	5.6e-09	2.1e-08	2.5e-06	5.3e-06
Zn-65	3.3e-02	1.2e-04	4.9e-04	1.2e-01	2.1e-01	6.5e-03	2.5e-05	9.7e-05	2.4e-02	4.1e-02
As-73	1.8e-04	5.7e-07	2.4e-06	6.1e-04	1.0e-03	3.6e-05	1.1e-07	4.8e-07	1.2e-04	2.1e-04
Se-75	2.2e-03	5.2e-05	2.8e-04	5.8e-03	1.1e-02	4.3e-04	1.0e-05	5.5e-05	1.1e-03	2.2e-03
Sr-85	3.2e-05	1.7e-07	5.3e-07	1.3e-04	2.1e-04	6.4e-06	3.4e-08	1.0e-07	2.5e-05	4.1e-05
Sr-89	1.3e-04	6.4e-07	2.0e-06	4.9e-04	8.1e-04	2.5e-05	1.3e-07	4.0e-07	9.7e-05	1.6e-04
Sr-90	4.7e-03	2.2e-05	7.6e-05	1.7e-02	2.9e-02	9.3e-04	4.5e-06	1.5e-05	3.5e-03	5.8e-03
Y-91	8.4e-05	4.5e-07	1.4e-06	3.4e-04	5.5e-04	1.7e-05	8.9e-08	2.6e-07	6.7e-05	1.1e-04
Zr-93	1.7e-05	9.4e-08	2.7e-07	6.9e-05	1.1e-04	3.3e-06	1.9e-08	5.3e-08	1.4e-05	2.2e-05
Zr-95	2.9e-05	1.6e-07	4.7e-07	1.2e-04	1.8e-04	5.7e-06	3.1e-08	9.3e-08	2.3e-05	3.7e-05
Nb-93m	7.5e-06	4.1e-08	1.2e-07	3.1e-05	4.8e-05	1.5e-06	8.1e-09	2.3e-08	6.1e-06	9.5e-06
Nb-94	1.1e-04	5.8e-07	1.7e-06	4.4e-04	6.9e-04	2.1e-05	1.2e-07	3.3e-07	8.7e-05	1.4e-04
Nb-95	1.2e-05	5.8e-08	1.9e-07	4.8e-05	7.5e-05	2.4e-06	1.2e-08	3.8e-08	9.3e-06	1.5e-05
Mo-93	3.6e-05	2.8e-07	9.3e-07	1.2e-04	2.3e-04	7.1e-06	5.6e-08	1.8e-07	2.4e-05	4.5e-05
Tc-97	1.0e-05	3.7e-08	2.3e-07	2.6e-05	6.1e-05	2.1e-06	7.3e-09	4.6e-08	5.1e-06	1.2e-05
Tc-97m	1.5e-05	7.9e-08	3.7e-07	4.4e-05	9.5e-05	3.1e-06	1.6e-08	7.4e-08	8.8e-06	1.9e-05
Tc-99	9.8e-05	3.5e-07	2.2e-06	2.5e-04	5.8e-04	1.9e-05	8.9e-08	4.3e-07	4.8e-05	1.1e-04
Ru-103	2.9e-06	2.3e-08	7.9e-08	9.8e-06	1.9e-05	5.8e-07	4.6e-09	1.6e-08	1.9e-06	3.9e-06
Ru-106	8.9e-05	5.9e-07	1.8e-06	2.4e-04	4.6e-04	1.4e-05	1.2e-07	3.6e-07	4.7e-05	9.1e-05
Ag-108m	4.3e-05	2.5e-06	1.0e-05	1.2e-04	2.2e-04	8.5e-06	5.0e-07	2.0e-06	2.3e-05	4.4e-05
Ag-110m	4.5e-05	2.6e-06	1.1e-05	1.2e-04	2.3e-04	8.8e-06	5.2e-07	2.1e-06	2.4e-05	4.6e-05
Cd-109	5.3e-03	2.3e-05	8.1e-05	1.9e-02	3.2e-02	1.0e-03	4.7e-06	1.6e-05	3.7e-03	6.2e-03
Sn-113	2.1e-05	7.2e-08	2.7e-07	7.7e-05	1.3e-04	4.2e-06	1.4e-08	5.4e-08	1.5e-05	2.6e-05
Sb-124	1.7e-03	8.6e-07	3.4e-06	7.1e-03	1.1e-02	3.3e-04	1.7e-07	6.8e-07	1.4e-03	2.1e-03
Sb-125	1.6e-03	8.6e-07	3.3e-06	7.0e-03	1.0e-02	3.2e-04	1.7e-07	6.5e-07	1.4e-03	2.1e-03
Te-123m	1.2e-03	1.0e-05	2.9e-05	4.7e-03	7.5e-03	2.4e-04	2.1e-06	5.6e-06	9.3e-04	1.5e-03
Te-127m	2.0e-03	1.7e-05	4.9e-05	8.0e-03	1.3e-02	4.0e-04	3.5e-06	9.6e-06	1.6e-03	2.5e-03
I-125	1.0e+00	2.9e-01	8.7e-01	1.8e+00	2.2e+00	2.0e-01	5.8e-02	1.7e-01	3.6e-01	4.4e-01
I-129	1.4e+01	4.2e+00	1.2e+01	2.5e+01	3.1e+01	2.8e+00	8.4e-01	2.4e+00	4.9e+00	5.9e+00
I-131	6.5e-02	4.2e-03	3.5e-02	1.7e-01	2.3e-01	1.3e-02	8.5e-04	6.9e-03	3.3e-02	4.4e-02
Cs-134	7.0e-02	4.3e-04	1.4e-03	2.7e-01	4.4e-01	1.4e-02	8.7e-05	2.8e-04	5.3e-02	8.8e-02
Cs-135	7.9e-03	4.9e-05	1.6e-04	3.0e-02	5.0e-02	1.6e-03	9.8e-06	3.2e-05	6.0e-03	1.0e-02
Cs-137	5.1e-02	3.1e-04	1.0e-03	1.9e-01	3.2e-01	1.0e-02	6.4e-05	2.1e-04	3.9e-02	6.4e-02
Ba-133	8.5e-05	3.5e-07	1.0e-06	2.6e-04	4.2e-04	1.3e-05	7.2e-08	2.0e-07	5.2e-05	8.3e-05
Ce-139	1.2e-05	6.5e-08	1.9e-07	4.8e-05	7.5e-05	2.3e-06	1.3e-08	3.7e-08	9.5e-06	1.5e-05
Ce-141	1.4e-05	6.5e-08	2.3e-07	5.3e-05	8.6e-05	2.7e-06	1.3e-08	4.4e-08	1.0e-05	1.7e-05
Ce-144	2.8e-04	1.5e-06	4.4e-06	1.1e-03	1.8e-03	5.5e-05	3.1e-07	8.7e-07	2.2e-04	3.5e-04
Pm-147	1.8e-05	9.4e-08	2.8e-07	7.2e-05	1.1e-04	3.5e-06	1.9e-08	5.4e-08	1.4e-05	2.2e-05

Table F2.29 Normalized effective doses from ingestion: Airborne emissions

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	6.9e-06	3.7e-08	1.1e-07	2.7e-05	4.4e-05	1.4e-06	7.4e-09	2.1e-08	5.4e-06	8.7e-06
Eu-152	9.7e-05	5.2e-07	1.5e-06	4.0e-04	6.1e-04	1.9e-05	1.1e-07	3.0e-07	7.9e-05	1.2e-04
Eu-154	1.4e-04	7.5e-07	2.2e-06	5.6e-04	8.7e-04	2.7e-05	1.5e-07	4.2e-07	1.1e-04	1.8e-04
Eu-155	2.2e-05	1.2e-07	3.4e-07	8.9e-05	1.4e-04	4.3e-06	2.4e-08	6.7e-08	1.8e-05	2.8e-05
Gd-153	1.6e-05	8.5e-08	2.5e-07	6.5e-05	1.0e-04	3.1e-06	1.7e-08	4.9e-08	1.3e-05	2.0e-05
Tb-160	6.4e-05	3.4e-07	1.0e-06	2.6e-04	4.1e-04	1.3e-05	6.7e-08	2.0e-07	5.1e-05	8.0e-05
Tm-170	6.6e-05	3.6e-07	1.0e-06	2.7e-04	4.1e-04	1.3e-05	7.1e-08	2.0e-07	5.3e-05	8.2e-05
Tm-171	7.2e-06	3.9e-08	1.1e-07	3.0e-05	4.5e-05	1.4e-06	7.9e-09	2.2e-08	5.9e-06	9.1e-06
Ta-182	6.4e-05	3.5e-07	1.0e-06	2.7e-04	4.1e-04	1.3e-05	6.9e-08	2.0e-07	5.2e-05	8.1e-05
W-181	2.5e-06	1.2e-08	6.1e-08	6.6e-06	1.4e-05	5.0e-07	2.4e-09	1.2e-08	1.3e-06	2.8e-06
W-185	1.1e-05	5.3e-08	2.6e-07	2.9e-05	6.1e-05	2.1e-06	1.1e-08	5.2e-08	5.7e-06	1.2e-05
Re-185	4.6e-04	2.7e-06	7.1e-06	2.0e-03	2.9e-03	9.1e-05	5.5e-07	1.4e-06	3.8e-04	5.6e-04
Ir-192	9.0e-06	7.3e-08	2.4e-07	3.2e-05	6.0e-05	1.8e-06	1.5e-08	4.7e-08	6.3e-06	1.2e-05
Tl-204	5.2e-03	2.1e-05	8.2e-05	1.7e-02	3.0e-02	1.0e-03	4.2e-06	1.6e-05	3.4e-03	5.9e-03
Pb-210	1.2e+00	7.3e-03	1.8e-02	5.0e+00	7.5e+00	2.3e-01	1.5e-03	3.5e-03	9.9e-01	1.5e+00
Bi-207	2.4e-03	1.3e-05	3.7e-05	9.6e-03	1.5e-02	4.7e-04	2.7e-06	7.2e-06	1.9e-03	2.9e-03
Po-210	2.9e-01	1.6e-03	4.2e-03	1.2e+00	1.8e+00	5.7e-02	3.3e-04	8.5e-04	2.4e-01	3.6e-01
Ra-226	2.1e-02	1.1e-04	3.3e-04	8.6e-02	1.3e-01	4.0e-03	2.3e-05	6.4e-05	1.7e-02	2.6e-02
Ra-228	4.8e-02	2.7e-04	7.6e-04	2.0e-01	3.1e-01	9.4e-03	5.3e-05	1.5e-04	3.9e-02	6.1e-02
Ac-227	7.3e-02	4.0e-04	1.2e-03	3.0e-01	4.7e-01	1.4e-02	8.0e-05	2.3e-04	6.0e-02	9.2e-02
Th-228	8.2e-03	4.5e-05	1.3e-04	3.4e-02	5.2e-02	1.6e-03	9.0e-06	2.5e-05	6.7e-03	1.0e-02
Th-229	3.7e-02	2.0e-04	5.8e-04	1.5e-01	2.4e-01	7.3e-03	4.1e-05	1.1e-04	3.0e-02	4.7e-02
Th-230	1.3e-02	7.1e-05	2.0e-04	5.4e-02	8.3e-02	2.6e-03	1.4e-05	4.0e-05	1.1e-02	1.6e-02
Th-232	1.4e-02	7.4e-05	2.1e-04	5.7e-02	8.7e-02	2.7e-03	1.5e-05	4.2e-05	1.1e-02	1.7e-02
Pa-231	4.5e-02	2.4e-04	7.0e-04	1.8e-01	2.9e-01	8.8e-03	4.9e-05	1.4e-04	3.6e-02	5.7e-02
U-232	2.2e-02	1.2e-04	3.4e-04	9.0e-02	1.4e-01	4.3e-03	2.4e-05	6.8e-05	1.8e-02	2.8e-02
U-233	3.3e-03	1.8e-05	5.2e-05	1.4e-02	2.1e-02	6.5e-04	3.7e-06	1.0e-05	2.7e-03	4.2e-03
U-234	3.2e-03	1.8e-05	5.1e-05	1.3e-02	2.1e-02	6.4e-04	3.6e-06	1.0e-05	2.7e-03	4.1e-03
U-235	3.0e-03	1.7e-05	4.8e-05	1.3e-02	2.0e-02	6.0e-04	3.4e-06	9.5e-06	2.5e-03	3.9e-03
U-236	3.0e-03	1.7e-05	4.8e-05	1.3e-02	2.0e-02	6.0e-04	3.4e-06	9.4e-06	2.5e-03	3.9e-03
U-238	3.1e-03	1.7e-05	4.9e-05	1.3e-02	2.0e-02	6.1e-04	3.5e-06	9.7e-06	2.6e-03	4.0e-03
Np-237	7.4e-03	4.1e-05	1.2e-04	3.0e-02	4.8e-02	1.5e-03	8.2e-06	2.3e-05	6.1e-03	9.6e-03
Pu-236	5.1e-03	2.7e-05	8.0e-05	2.1e-02	3.2e-02	1.0e-03	5.5e-06	1.6e-05	4.2e-03	6.3e-03
Pu-238	1.4e-02	7.6e-05	2.2e-04	5.7e-02	9.0e-02	2.8e-03	1.5e-05	4.3e-05	1.2e-02	1.8e-02
Pu-239	1.5e-02	8.3e-05	2.4e-04	6.3e-02	9.8e-02	3.0e-03	1.7e-05	4.7e-05	1.3e-02	1.9e-02
Pu-240	1.5e-02	8.3e-05	2.4e-04	6.3e-02	9.8e-02	3.0e-03	1.7e-05	4.7e-05	1.3e-02	1.9e-02
Pu-241	2.9e-04	1.6e-06	4.5e-06	1.2e-03	1.8e-03	5.6e-05	3.1e-07	8.8e-07	2.3e-04	3.6e-04
Pu-242	1.5e-02	8.0e-05	2.3e-04	6.0e-02	9.4e-02	2.9e-03	1.6e-05	4.5e-05	1.2e-02	1.8e-02
Pu-244	1.5e-02	8.0e-05	2.3e-04	6.0e-02	9.5e-02	2.9e-03	1.6e-05	4.5e-05	1.2e-02	1.9e-02
Am-241	1.2e-02	6.7e-05	1.9e-04	5.0e-02	7.8e-02	2.4e-03	1.4e-05	3.8e-05	1.0e-02	1.5e-02
Am-242m	1.2e-02	6.7e-05	1.9e-04	5.0e-02	7.8e-02	2.4e-03	1.4e-05	3.8e-05	1.0e-02	1.5e-02
Am-243	1.2e-02	6.8e-05	1.9e-04	5.0e-02	7.8e-02	2.4e-03	1.4e-05	3.8e-05	1.0e-02	1.6e-02
Cm-242	5.7e-04	3.1e-06	9.0e-06	2.3e-03	3.7e-03	1.1e-04	6.3e-07	1.8e-06	4.6e-04	7.3e-04
Cm-243	9.1e-03	5.0e-05	1.4e-04	3.7e-02	6.0e-02	1.8e-03	1.0e-05	2.8e-05	7.4e-03	1.2e-02
Cm-244	7.3e-03	4.0e-05	1.1e-04	3.0e-02	4.8e-02	1.4e-03	8.0e-06	2.2e-05	5.9e-03	9.4e-03
Cm-245	1.3e-02	7.0e-05	2.0e-04	5.3e-02	8.4e-02	2.5e-03	1.4e-05	3.9e-05	1.0e-02	1.7e-02
Cm-248	1.3e-02	7.0e-05	2.0e-04	5.3e-02	8.4e-02	2.5e-03	1.4e-05	3.9e-05	1.0e-02	1.7e-02
Cm-247	1.2e-02	6.4e-05	1.8e-04	4.8e-02	7.6e-02	2.3e-03	1.3e-05	3.6e-05	9.4e-03	1.5e-02
Cm-248	4.7e-02	2.6e-04	7.4e-04	1.9e-01	3.1e-01	9.3e-03	5.2e-05	1.4e-04	3.8e-02	6.1e-02
Bk-249	5.3e-05	2.9e-07	8.3e-07	2.1e-04	3.4e-04	1.0e-05	5.7e-08	1.6e-07	4.2e-05	6.6e-05
Cf-248	1.5e-03	8.2e-06	2.4e-05	6.4e-03	1.0e-02	3.0e-04	1.7e-06	4.6e-06	1.3e-03	1.9e-03
Cf-249	2.2e-02	1.2e-04	3.4e-04	9.0e-02	1.4e-01	4.3e-03	2.4e-05	6.6e-05	1.8e-02	2.7e-02
Cf-250	9.8e-03	5.3e-05	1.5e-04	4.1e-02	6.4e-02	1.9e-03	1.1e-05	3.0e-05	8.1e-03	1.2e-02
Cf-251	2.2e-02	1.2e-04	3.5e-04	9.2e-02	1.4e-01	4.4e-03	2.4e-05	6.8e-05	1.8e-02	2.8e-02
Cf-252	5.4e-03	2.9e-05	8.3e-05	2.2e-02	3.5e-02	1.1e-03	5.8e-06	1.6e-05	4.4e-03	6.7e-03
Cf-254	1.3e-02	6.7e-05	2.0e-04	5.3e-02	8.2e-02	2.6e-03	1.3e-05	4.0e-05	1.1e-02	1.6e-02
Es-254	1.5e-03	8.1e-06	2.3e-05	6.0e-03	9.6e-03	2.9e-04	1.6e-06	4.6e-06	1.2e-03	1.8e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.30 Normalized effective doses from all pathways: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.4e+00	3.1e+00	5.2e+00	7.5e+00	8.2e+00	1.1e+00	6.2e-01	1.0e+00	1.5e+00	1.6e+00
P-32	5.1e-07	1.3e-07	4.1e-07	1.0e-06	1.2e-06	1.0e-07	2.6e-08	8.2e-08	2.0e-07	2.3e-07
S-35	3.2e-05	1.8e-05	3.1e-05	4.7e-05	5.3e-05	6.3e-06	3.3e-06	6.0e-06	9.2e-06	1.0e-05
Cl-36	8.2e-04	2.2e-04	7.6e-04	1.4e-03	1.7e-03	1.6e-04	4.4e-05	1.5e-04	2.8e-04	3.2e-04
K-40	4.9e-01	2.8e-01	4.8e-01	6.8e-01	7.5e-01	9.6e-02	5.7e-02	9.4e-02	1.3e-01	1.5e-01
Ca-41	1.4e-04	3.2e-05	1.4e-04	2.4e-04	2.7e-04	2.8e-05	6.5e-06	2.7e-05	4.7e-05	5.2e-05
Ca-45	2.5e-04	1.1e-04	2.4e-04	3.8e-04	4.2e-04	5.0e-05	2.3e-05	4.8e-05	7.5e-05	8.2e-05
Sc-46	1.9e+00	1.1e+00	1.8e+00	2.6e+00	2.9e+00	3.7e-01	2.2e-01	3.6e-01	5.1e-01	5.6e-01
Cr-51	2.4e-04	5.6e-05	2.1e-04	4.4e-04	5.3e-04	4.7e-05	1.1e-05	4.1e-05	8.5e-05	1.0e-04
Mn-53	1.5e-05	4.5e-06	1.4e-05	2.5e-05	2.8e-05	2.9e-06	9.1e-07	2.9e-06	4.8e-06	5.3e-06
Mn-54	2.5e+00	1.5e+00	2.5e+00	3.5e+00	3.8e+00	5.0e-01	3.0e-01	4.9e-01	6.8e-01	7.4e-01
Fe-55	3.9e-06	9.2e-07	3.5e-06	7.2e-06	8.3e-06	7.7e-07	1.8e-07	6.9e-07	1.4e-06	1.6e-06
Fe-59	6.2e-03	2.5e-03	5.6e-03	1.0e-02	1.2e-02	1.2e-03	5.0e-04	1.1e-03	2.0e-03	2.3e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.6e-01	1.4e-01	2.5e-01	3.7e-01	4.0e-01	5.0e-02	2.9e-02	4.9e-02	7.1e-02	7.8e-02
Sr-89	7.9e-04	4.3e-04	7.6e-04	1.1e-03	1.3e-03	1.6e-04	8.7e-05	1.5e-04	2.2e-04	2.5e-04
Sr-90	5.3e-02	3.1e-02	5.2e-02	7.3e-02	8.0e-02	1.1e-02	6.3e-03	1.0e-02	1.4e-02	1.5e-02
Y-91	2.9e-03	1.6e-03	2.8e-03	4.1e-03	4.5e-03	5.7e-04	3.2e-04	5.5e-04	8.0e-04	8.8e-04
Zr-93	9.1e-04	4.6e-04	8.7e-04	1.4e-03	1.5e-03	1.8e-04	9.4e-05	1.7e-04	2.6e-04	2.9e-04
Zr-95	1.1e+00	6.3e-01	1.1e+00	1.6e+00	1.8e+00	2.2e-01	1.3e-01	2.2e-01	3.1e-01	3.4e-01
Nb-93m	2.2e-04	1.2e-04	2.1e-04	3.0e-04	3.3e-04	4.2e-05	2.5e-05	4.1e-05	5.8e-05	6.3e-05
Nb-94	8.5e+00	4.9e+00	8.3e+00	1.2e+01	1.3e+01	1.7e+00	1.0e+00	1.6e+00	2.3e+00	2.4e+00
Nb-95	5.8e-02	2.8e-02	5.4e-02	8.9e-02	1.0e-01	1.1e-02	5.8e-03	1.1e-02	1.7e-02	1.9e-02
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.6e-02	7.6e-03	2.3e-02	4.5e-02	5.3e-02	5.0e-03	1.5e-03	4.5e-03	8.7e-03	1.0e-02
Sb-125	5.4e-02	1.8e-02	4.9e-02	9.4e-02	1.1e-01	1.1e-02	3.3e-03	9.8e-03	1.8e-02	2.1e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.7e-04	9.2e-05	3.3e-04	6.8e-04	7.9e-04	7.4e-05	1.8e-05	6.6e-05	1.3e-04	1.6e-04
I-129	1.5e-02	2.7e-03	1.2e-02	2.9e-02	3.5e-02	2.9e-03	5.4e-04	2.4e-03	5.8e-03	6.9e-03
I-131	6.3e-09	3.6e-10	3.1e-09	1.6e-08	2.3e-08	1.2e-09	7.2e-11	6.2e-10	3.3e-09	4.5e-09
Cs-134	1.7e-01	5.2e-02	1.5e-01	3.0e-01	3.4e-01	3.3e-02	1.0e-02	3.0e-02	5.8e-02	6.7e-02
Cs-135	2.4e-05	3.9e-06	1.9e-05	4.9e-05	5.9e-05	4.7e-06	7.9e-07	3.9e-06	9.5e-06	1.2e-05
Cs-137	7.3e-02	2.2e-02	6.6e-02	1.3e-01	1.5e-01	1.4e-02	4.4e-03	1.3e-02	2.5e-02	2.9e-02
Ba-133	1.6e+00	9.5e-01	1.6e+00	2.2e+00	2.4e+00	3.2e-01	2.0e-01	3.1e-01	4.4e-01	4.7e-01
Ce-139	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.8e-01	3.6e-02	2.2e-02	3.5e-02	4.9e-02	5.3e-02
Ce-141	2.8e-03	1.3e-03	2.6e-03	4.3e-03	4.9e-03	5.4e-04	2.7e-04	5.1e-04	8.4e-04	9.4e-04
Ce-144	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.7e-01	3.6e-02	2.2e-02	3.6e-02	4.9e-02	5.3e-02
Pm-147	4.5e-04	2.4e-04	4.4e-04	6.6e-04	7.4e-04	8.9e-05	4.9e-05	8.6e-05	1.3e-04	1.4e-04

Table F2.30 Normalized effective doses from all pathways: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.5e-04	1.8e-04	3.4e-04	5.2e-04	5.9e-04	6.9e-05	3.6e-05	6.6e-05	1.0e-04	1.1e-04
Eu-152	6.0e+00	3.5e+00	5.8e+00	8.2e+00	8.9e+00	1.2e+00	7.1e-01	1.2e+00	1.6e+00	1.7e+00
Eu-154	6.5e+00	3.8e+00	6.3e+00	8.9e+00	9.6e+00	1.3e+00	7.7e-01	1.2e+00	1.7e+00	1.9e+00
Eu-155	1.4e-01	8.1e-02	1.4e-01	1.9e-01	2.1e-01	2.7e-02	1.7e-02	2.7e-02	3.7e-02	4.0e-02
Gd-153	1.1e-01	6.2e-02	1.0e-01	1.5e-01	1.6e-01	2.1e-02	1.3e-02	2.1e-02	2.9e-02	3.1e-02
Tb-160	7.7e-01	4.3e-01	7.4e-01	1.1e+00	1.2e+00	1.5e-01	8.8e-02	1.5e-01	2.1e-01	2.3e-01
Tm-170	4.4e-03	2.6e-03	4.3e-03	6.1e-03	6.7e-03	8.8e-04	5.4e-04	8.6e-04	1.2e-03	1.3e-03
Tm-171	6.3e-04	5.0e-04	6.1e-04	1.1e-03	1.2e-03	1.6e-04	1.0e-04	1.6e-04	2.2e-04	2.3e-04
Ta-182	1.9e+00	1.1e+00	1.9e+00	2.6e+00	2.9e+00	3.7e-01	2.2e-01	3.7e-01	5.1e-01	5.6e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.0e+01	6.0e+00	1.0e+01	1.4e+01	1.5e+01	2.0e+00	1.2e+00	2.0e+00	2.7e+00	2.9e+00
Ra-228	7.8e+00	4.7e+00	7.6e+00	1.1e+01	1.1e+01	1.5e+00	9.6e-01	1.5e+00	2.0e+00	2.2e+00
Ac-227	9.3e+00	5.1e+00	8.9e+00	1.3e+01	1.5e+01	1.8e+00	1.0e+00	1.7e+00	2.6e+00	2.9e+00
Th-228	1.1e+01	6.5e+00	1.0e+01	1.4e+01	1.6e+01	2.1e+00	1.3e+00	2.1e+00	2.8e+00	3.0e+00
Th-229	8.6e+00	4.6e+00	8.3e+00	1.3e+01	1.4e+01	1.7e+00	9.4e-01	1.6e+00	2.4e+00	2.7e+00
Th-230	9.1e-01	4.5e-01	8.6e-01	1.4e+00	1.5e+00	1.8e-01	9.1e-02	1.7e-01	2.6e-01	3.0e-01
Th-232	2.0e+00	1.1e+00	1.9e+00	2.8e+00	3.2e+00	3.9e-01	2.2e-01	3.7e-01	5.4e-01	6.1e-01
Pa-231	2.7e+00	1.4e+00	2.6e+00	3.9e+00	4.4e+00	5.3e-01	2.9e-01	5.0e-01	7.5e-01	8.5e-01
U-232	5.7e+00	3.2e+00	5.5e+00	8.0e+00	8.9e+00	1.1e+00	6.5e-01	1.1e+00	1.5e+00	1.7e+00
U-233	8.4e-01	4.0e-01	7.9e-01	1.3e+00	1.4e+00	1.6e-01	8.2e-02	1.6e-01	2.4e-01	2.8e-01
U-234	8.2e-01	4.0e-01	7.8e-01	1.2e+00	1.4e+00	1.6e-01	8.0e-02	1.5e-01	2.4e-01	2.8e-01
U-235	1.4e+00	8.1e-01	1.3e+00	1.9e+00	2.1e+00	2.7e-01	1.7e-01	2.7e-01	3.7e-01	4.0e-01
U-236	7.6e-01	3.7e-01	7.2e-01	1.2e+00	1.3e+00	1.5e-01	7.4e-02	1.4e-01	2.2e-01	2.6e-01
U-238	8.2e-01	4.3e-01	7.8e-01	1.2e+00	1.4e+00	1.6e-01	8.8e-02	1.5e-01	2.3e-01	2.6e-01
Np-237	2.8e+00	1.6e+00	2.7e+00	3.9e+00	4.3e+00	5.5e-01	3.3e-01	5.3e-01	7.6e-01	8.4e-01
Pu-236	8.3e-01	4.1e-01	7.8e-01	1.2e+00	1.4e+00	1.6e-01	8.3e-02	1.5e-01	2.4e-01	2.7e-01
Pu-238	1.4e+00	7.0e-01	1.3e+00	2.1e+00	2.4e+00	2.8e-01	1.4e-01	2.6e-01	4.1e-01	4.6e-01
Pu-239	1.1e+00	5.5e-01	1.0e+00	1.6e+00	1.9e+00	2.2e-01	1.1e-01	2.1e-01	3.2e-01	3.6e-01
Pu-240	1.1e+00	5.5e-01	1.0e+00	1.6e+00	1.9e+00	2.2e-01	1.1e-01	2.1e-01	3.2e-01	3.6e-01
Pu-241	1.5e-02	7.5e-03	1.4e-02	2.2e-02	2.5e-02	2.9e-03	1.5e-03	2.8e-03	4.2e-03	4.8e-03
Pu-242	1.0e+00	5.2e-01	9.7e-01	1.5e+00	1.7e+00	2.0e-01	1.0e-01	1.9e-01	2.9e-01	3.3e-01
Pu-244	2.8e+00	1.7e+00	2.7e+00	3.7e+00	4.0e+00	5.5e-01	3.4e-01	5.4e-01	7.2e-01	7.8e-01
Am-241	3.4e+00	1.7e+00	3.2e+00	5.1e+00	5.8e+00	6.6e-01	3.4e-01	6.3e-01	9.8e-01	1.1e+00
Am-242m	3.4e+00	1.7e+00	3.2e+00	5.1e+00	5.8e+00	6.7e-01	3.4e-01	6.3e-01	9.8e-01	1.1e+00
Am-243	4.1e+00	2.2e+00	3.9e+00	5.9e+00	6.6e+00	8.1e-01	4.5e-01	7.7e-01	1.1e+00	1.3e+00
Cm-242	1.8e-01	8.9e-02	1.7e-01	2.8e-01	3.2e-01	3.6e-02	1.8e-02	3.4e-02	5.4e-02	6.2e-02
Cm-243	2.9e+00	1.6e+00	2.8e+00	4.2e+00	4.8e+00	5.8e-01	3.2e-01	5.5e-01	8.2e-01	9.2e-01
Cm-244	2.0e+00	1.0e+00	1.9e+00	3.1e+00	3.5e+00	4.0e-01	2.0e-01	3.8e-01	6.0e-01	6.8e-01
Cm-245	3.6e+00	1.8e+00	3.4e+00	5.3e+00	6.1e+00	7.1e-01	3.8e-01	6.8e-01	1.0e+00	1.2e+00
Cm-246	3.3e+00	1.6e+00	3.1e+00	5.0e+00	5.7e+00	6.6e-01	3.3e-01	6.2e-01	9.7e-01	1.1e+00
Cm-247	4.7e+00	2.7e+00	4.5e+00	6.5e+00	7.3e+00	9.2e-01	5.5e-01	8.9e-01	1.3e+00	1.4e+00
Cm-248	1.2e+01	5.7e+00	1.1e+01	1.8e+01	2.0e+01	2.3e+00	1.2e+00	2.2e+00	3.4e+00	3.9e+00
Bk-249	1.4e-02	7.5e-03	1.4e-02	2.1e-02	2.4e-02	2.8e-03	1.5e-03	2.7e-03	4.1e-03	4.7e-03
Cf-248	5.1e-01	2.5e-01	4.8e-01	7.8e-01	8.8e-01	1.0e-01	5.1e-02	9.6e-02	1.5e-01	1.7e-01
Cf-249	7.2e+00	4.0e+00	6.9e+00	1.0e+01	1.1e+01	1.4e+00	8.0e-01	1.3e+00	2.0e+00	2.2e+00
Cf-250	2.6e+00	1.3e+00	2.5e+00	4.0e+00	4.5e+00	5.2e-01	2.6e-01	4.9e-01	7.7e-01	8.7e-01
Cf-251	6.1e+00	3.1e+00	5.8e+00	9.1e+00	1.0e+01	1.2e+00	6.4e-01	1.1e+00	1.8e+00	2.0e+00
Cf-252	1.4e+00	6.7e-01	1.3e+00	2.1e+00	2.4e+00	2.7e-01	1.4e-01	2.6e-01	4.0e-01	4.6e-01
Cf-254	2.4e-01	1.2e-01	2.2e-01	3.6e-01	4.2e-01	4.7e-02	2.3e-02	4.3e-02	7.2e-02	8.1e-02
Es-254	3.3e+00	2.0e+00	3.3e+00	4.5e+00	4.9e+00	6.6e-01	4.1e-01	6.4e-01	8.7e-01	9.4e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.31 Normalized effective doses from external exposure: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.4e+00	3.1e+00	5.2e+00	7.5e+00	8.2e+00	1.1e+00	6.2e-01	1.0e+00	1.5e+00	1.6e+00
P-32	4.8e-07	1.2e-07	3.9e-07	9.5e-07	1.1e-06	9.4e-08	2.4e-08	7.7e-08	1.9e-07	2.2e-07
S-35	1.8e-06	1.0e-06	1.8e-06	2.6e-06	2.8e-06	3.6e-07	2.1e-07	3.5e-07	4.9e-07	5.4e-07
Cl-36	5.7e-04	1.5e-04	5.3e-04	1.0e-03	1.2e-03	1.1e-04	3.1e-05	1.0e-04	2.0e-04	2.3e-04
K-40	4.9e-01	2.8e-01	4.7e-01	6.8e-01	7.5e-01	9.6e-02	5.7e-02	9.4e-02	1.3e-01	1.4e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.0e-05	1.2e-05	1.9e-05	2.7e-05	3.0e-05	3.9e-06	2.4e-06	3.8e-06	5.3e-06	5.8e-06
Sc-46	1.9e+00	1.1e+00	1.8e+00	2.6e+00	2.9e+00	3.7e-01	2.2e-01	3.6e-01	5.1e-01	5.6e-01
Cr-51	2.4e-04	5.6e-05	2.1e-04	4.4e-04	5.3e-04	4.7e-05	1.1e-05	4.1e-05	8.6e-05	1.0e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.5e+00	1.5e+00	2.5e+00	3.5e+00	3.8e+00	5.0e-01	3.0e-01	4.9e-01	6.8e-01	7.4e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	6.2e-03	2.5e-03	5.6e-03	1.0e-02	1.2e-02	1.2e-03	5.0e-04	1.1e-03	2.0e-03	2.3e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.6e-01	1.4e-01	2.5e-01	3.7e-01	4.0e-01	5.0e-02	2.9e-02	4.9e-02	7.1e-02	7.8e-02
Sr-89	7.3e-04	3.9e-04	7.0e-04	1.1e-03	1.2e-03	1.4e-04	7.9e-05	1.4e-04	2.1e-04	2.3e-04
Sr-90	3.7e-02	2.2e-02	3.7e-02	5.2e-02	5.6e-02	7.4e-03	4.5e-03	7.2e-03	1.0e-02	1.1e-02
Y-91	2.7e-03	1.5e-03	2.6e-03	3.9e-03	4.3e-03	5.4e-04	3.0e-04	5.2e-04	7.6e-04	8.5e-04
Zr-93	1.6e-06	9.4e-07	1.6e-06	2.3e-06	2.5e-06	3.2e-07	1.9e-07	3.2e-07	4.4e-07	4.7e-07
Zr-95	1.1e+00	6.3e-01	1.1e+00	1.6e+00	1.8e+00	2.2e-01	1.3e-01	2.2e-01	3.1e-01	3.4e-01
Nb-93m	6.7e-05	3.9e-05	6.5e-05	9.2e-05	1.0e-04	1.3e-05	8.0e-06	1.3e-05	1.8e-05	1.9e-05
Nb-94	8.5e+00	4.9e+00	8.3e+00	1.2e+01	1.3e+01	1.7e+00	1.0e+00	1.6e+00	2.3e+00	2.4e+00
Nb-95	5.8e-02	2.8e-02	5.4e-02	8.9e-02	1.0e-01	1.1e-02	5.8e-03	1.1e-02	1.7e-02	1.9e-02
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.6e-02	7.6e-03	2.3e-02	4.5e-02	5.3e-02	5.0e-03	1.5e-03	4.5e-03	8.7e-03	1.0e-02
Sb-125	5.4e-02	1.8e-02	4.9e-02	9.4e-02	1.1e-01	1.1e-02	3.3e-03	9.8e-03	1.8e-02	2.1e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	2.3e-04	5.8e-05	2.1e-04	4.1e-04	4.9e-04	4.5e-05	1.2e-05	4.1e-05	8.1e-05	9.6e-05
I-129	2.2e-03	5.8e-04	2.0e-03	3.9e-03	4.5e-03	4.4e-04	1.2e-04	4.0e-04	7.7e-04	8.9e-04
I-131	6.3e-09	3.6e-10	3.1e-09	1.6e-08	2.3e-08	1.2e-09	7.2e-11	6.2e-10	3.2e-09	4.5e-09
Cs-134	1.7e-01	5.2e-02	1.5e-01	2.9e-01	3.4e-01	3.3e-02	1.0e-02	3.0e-02	5.8e-02	6.7e-02
Cs-135	7.5e-07	2.3e-07	6.7e-07	1.3e-06	1.5e-06	1.5e-07	4.5e-08	1.3e-07	2.5e-07	3.0e-07
Cs-137	7.3e-02	2.2e-02	6.6e-02	1.3e-01	1.5e-01	1.4e-02	4.4e-03	1.3e-02	2.5e-02	2.9e-02
Ba-133	1.6e+00	9.5e-01	1.6e+00	2.2e+00	2.4e+00	3.2e-01	2.0e-01	3.1e-01	4.3e-01	4.7e-01
Ce-139	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.8e-01	3.6e-02	2.2e-02	3.5e-02	4.9e-02	5.3e-02
Ce-141	2.8e-03	1.3e-03	2.6e-03	4.3e-03	4.9e-03	5.4e-04	2.7e-04	5.1e-04	8.3e-04	9.4e-04
Ce-144	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.7e-01	3.6e-02	2.2e-02	3.5e-02	4.8e-02	5.2e-02
Pm-147	3.4e-05	2.0e-05	3.3e-05	4.7e-05	5.1e-05	6.7e-06	4.1e-06	6.6e-06	9.1e-06	9.8e-06

Table F2.31 Normalized effective doses from external exposure: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	6.3e-07	3.6e-07	6.1e-07	8.6e-07	9.4e-07	1.2e-07	7.5e-08	1.2e-07	1.7e-07	1.8e-07
Eu-152	6.0e+00	3.5e+00	5.8e+00	8.2e+00	8.9e+00	1.2e+00	7.1e-01	1.2e+00	1.6e+00	1.7e+00
Eu-154	6.4e+00	3.8e+00	6.3e+00	8.9e+00	9.6e+00	1.3e+00	7.7e-01	1.2e+00	1.7e+00	1.9e+00
Eu-155	1.4e-01	8.1e-02	1.4e-01	1.9e-01	2.1e-01	2.7e-02	1.7e-02	2.7e-02	3.7e-02	4.0e-02
Gd-153	1.1e-01	6.2e-02	1.0e-01	1.5e-01	1.6e-01	2.1e-02	1.3e-02	2.1e-02	2.8e-02	3.1e-02
Tb-160	7.7e-01	4.3e-01	7.4e-01	1.1e+00	1.2e+00	1.5e-01	8.8e-02	1.5e-01	2.1e-01	2.3e-01
Tm-170	4.1e-03	2.4e-03	4.0e-03	5.7e-03	6.2e-03	8.1e-04	4.8e-04	7.9e-04	1.1e-03	1.2e-03
Tm-171	7.1e-04	4.1e-04	6.9e-04	9.7e-04	1.1e-03	1.4e-04	8.5e-05	1.4e-04	1.9e-04	2.0e-04
Ta-182	1.9e+00	1.1e+00	1.9e+00	2.6e+00	2.9e+00	3.7e-01	2.2e-01	3.7e-01	5.1e-01	5.6e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	9.8e+00	5.7e+00	9.6e+00	1.4e+01	1.5e+01	1.9e+00	1.2e+00	1.9e+00	2.6e+00	2.8e+00
Ra-228	6.6e+00	3.8e+00	6.4e+00	9.1e+00	9.9e+00	1.3e+00	7.9e-01	1.3e+00	1.8e+00	1.9e+00
Ac-227	1.7e+00	9.9e-01	1.7e+00	2.4e+00	2.5e+00	3.4e-01	2.0e-01	3.3e-01	4.6e-01	4.9e-01
Th-228	7.3e+00	4.2e+00	7.1e+00	1.0e+01	1.1e+01	1.4e+00	8.7e-01	1.4e+00	1.9e+00	2.1e+00
Th-229	1.4e+00	8.0e-01	1.3e+00	1.9e+00	2.0e+00	2.7e-01	1.6e-01	2.6e-01	3.6e-01	3.9e-01
Th-230	3.5e-03	2.0e-03	3.4e-03	4.9e-03	5.3e-03	6.9e-04	4.2e-04	6.8e-04	9.4e-04	1.0e-03
Th-232	4.3e-01	2.4e-01	4.2e-01	5.9e-01	6.4e-01	8.4e-02	5.0e-02	8.2e-02	1.1e-01	1.2e-01
Pa-231	2.0e-01	1.1e-01	1.9e-01	2.7e-01	2.9e-01	3.9e-02	2.4e-02	3.8e-02	5.3e-02	5.7e-02
U-232	1.7e+00	1.0e+00	1.7e+00	2.4e+00	2.6e+00	3.4e-01	2.1e-01	3.3e-01	4.7e-01	5.0e-01
U-233	1.9e-03	7.3e-04	1.2e-03	1.7e-03	1.9e-03	2.5e-04	1.5e-04	2.4e-04	3.3e-04	3.6e-04
U-234	3.2e-04	1.9e-04	3.1e-04	4.4e-04	4.8e-04	6.3e-05	3.8e-05	6.2e-05	8.5e-05	9.2e-05
U-235	6.4e-01	3.7e-01	6.3e-01	8.9e-01	9.6e-01	1.3e-01	7.7e-02	1.2e-01	1.7e-01	1.9e-01
U-236	1.7e-04	9.6e-05	1.6e-04	2.3e-04	2.5e-04	3.3e-05	2.0e-05	3.2e-05	4.4e-05	4.8e-05
U-238	1.3e-01	7.4e-02	1.2e-01	1.8e-01	1.9e-01	2.5e-02	1.5e-02	2.5e-02	3.4e-02	3.7e-02
Np-237	9.4e-01	5.5e-01	9.2e-01	1.3e+00	1.4e+00	1.9e-01	1.1e-01	1.8e-01	2.5e-01	2.7e-01
Pu-236	5.3e-03	2.9e-03	5.1e-03	7.4e-03	8.1e-03	1.0e-03	6.0e-04	1.0e-03	1.4e-03	1.6e-03
Pu-238	1.1e-04	6.3e-05	1.1e-04	1.5e-04	1.6e-04	2.1e-05	1.3e-05	2.1e-05	2.9e-05	3.1e-05
Pu-239	2.4e-04	1.4e-04	2.4e-04	3.4e-04	3.7e-04	4.8e-05	2.9e-05	4.7e-05	6.5e-05	7.0e-05
Pu-240	1.0e-04	6.1e-05	1.0e-04	1.4e-04	1.6e-04	2.1e-05	1.3e-05	2.0e-05	2.8e-05	3.0e-05
Pu-241	5.7e-05	2.1e-05	3.6e-05	5.2e-05	5.6e-05	7.3e-06	4.4e-06	7.2e-06	1.0e-05	1.1e-05
Pu-242	9.2e-05	5.4e-05	9.0e-05	1.3e-04	1.4e-04	1.8e-05	1.1e-05	1.8e-05	2.5e-05	2.7e-05
Pu-244	1.8e+00	1.0e+00	1.7e+00	2.5e+00	2.7e+00	3.5e-01	2.1e-01	3.4e-01	4.7e-01	5.1e-01
Am-241	3.5e-02	2.0e-02	3.4e-02	4.8e-02	5.2e-02	6.8e-03	4.1e-03	6.7e-03	9.2e-03	9.9e-03
Am-242m	5.7e-02	3.3e-02	5.5e-02	7.8e-02	8.5e-02	1.1e-02	6.8e-03	1.1e-02	1.5e-02	1.6e-02
Am-243	7.6e-01	4.4e-01	7.4e-01	1.0e+00	1.1e+00	1.5e-01	9.1e-02	1.5e-01	2.0e-01	2.2e-01
Cm-242	4.8e-05	2.8e-05	4.7e-05	6.6e-05	7.2e-05	9.5e-06	5.7e-06	9.3e-06	1.3e-05	1.4e-05
Cm-243	4.9e-01	2.9e-01	4.8e-01	6.8e-01	7.3e-01	9.7e-02	5.9e-02	9.5e-02	1.3e-01	1.4e-01
Cm-244	8.2e-05	4.7e-05	8.0e-05	1.1e-04	1.2e-04	1.6e-05	9.8e-06	1.6e-05	2.2e-05	2.3e-05
Cm-245	2.8e-01	1.7e-01	2.8e-01	3.9e-01	4.3e-01	5.6e-02	3.4e-02	5.5e-02	7.6e-02	8.2e-02
Cm-246	7.1e-05	4.5e-05	7.5e-05	1.1e-04	1.2e-04	1.5e-05	9.3e-06	1.5e-05	2.1e-05	2.2e-05
Cm-247	1.6e+00	9.3e-01	1.6e+00	2.2e+00	2.4e+00	3.2e-01	1.9e-01	3.1e-01	4.3e-01	4.6e-01
Cm-248	5.8e-05	3.4e-05	5.7e-05	8.0e-05	8.7e-05	1.1e-05	7.0e-06	1.1e-05	1.6e-05	1.7e-05
Bk-249	1.5e-03	8.6e-04	1.5e-03	2.1e-03	2.2e-03	2.9e-04	1.8e-04	2.9e-04	4.0e-04	4.3e-04
Cf-248	5.4e-05	3.1e-05	5.2e-05	7.4e-05	8.0e-05	1.1e-05	6.4e-06	1.0e-05	1.4e-05	1.5e-05
Cf-249	1.6e+00	9.3e-01	1.6e+00	2.2e+00	2.4e+00	3.1e-01	1.9e-01	3.1e-01	4.3e-01	4.6e-01
Cf-250	7.5e-05	4.4e-05	7.3e-05	1.0e-04	1.1e-04	1.5e-05	9.0e-06	1.4e-05	2.0e-05	2.2e-05
Cf-251	4.5e-01	2.6e-01	4.4e-01	6.1e-01	6.7e-01	8.8e-02	5.3e-02	8.6e-02	1.2e-01	1.3e-01
Cf-252	1.1e-04	6.3e-05	1.1e-04	1.5e-04	1.6e-04	2.1e-05	1.3e-05	2.1e-05	2.9e-05	3.1e-05
Cf-254	2.1e-08	1.2e-08	2.1e-08	3.0e-08	3.4e-08	4.2e-09	2.4e-09	4.0e-09	5.9e-09	6.5e-09
Es-254	2.8e+00	1.7e+00	2.8e+00	3.9e+00	4.3e+00	5.6e-01	3.4e-01	5.5e-01	7.6e-01	8.2e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.32 Normalized effective doses from inhalation: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.1e-04	5.1e-05	1.0e-04	1.6e-04	1.9e-04	2.1e-05	1.0e-05	2.0e-05	3.2e-05	3.6e-05
P-32	3.4e-09	7.7e-10	2.6e-09	6.8e-09	8.4e-09	6.6e-10	1.5e-10	5.2e-10	1.3e-09	1.7e-09
S-35	2.1e-05	1.0e-05	2.0e-05	3.2e-05	3.7e-05	4.2e-06	2.0e-06	3.9e-06	6.3e-06	7.2e-06
Cl-36	1.5e-04	3.7e-05	1.3e-04	2.8e-04	3.4e-04	3.0e-05	7.3e-06	2.7e-05	5.5e-05	6.6e-05
K-40	1.9e-04	9.0e-05	1.8e-04	2.9e-04	3.3e-04	3.8e-05	1.8e-05	3.5e-05	5.6e-05	6.4e-05
Ca-41	2.3e-05	1.1e-05	2.2e-05	3.5e-05	4.0e-05	4.5e-06	2.2e-06	4.3e-06	6.7e-06	7.6e-06
Ca-45	1.1e-04	5.3e-05	1.0e-04	1.7e-04	1.9e-04	2.2e-05	1.1e-05	2.1e-05	3.3e-05	3.7e-05
Sc-46	9.7e-05	4.6e-05	9.0e-05	1.5e-04	1.7e-04	1.9e-05	9.3e-06	1.8e-05	2.9e-05	3.3e-05
Cr-51	8.9e-09	1.5e-09	5.7e-09	1.3e-08	1.6e-08	1.4e-09	3.0e-10	1.1e-09	2.6e-09	3.2e-09
Mn-53	3.9e-06	1.9e-06	3.7e-06	5.9e-06	6.8e-06	7.7e-07	3.8e-07	7.3e-07	1.2e-06	1.3e-06
Mn-54	8.1e-05	3.9e-05	7.6e-05	1.2e-04	1.4e-04	1.6e-05	7.9e-06	1.5e-05	2.4e-05	2.7e-05
Fe-55	8.9e-07	3.4e-07	8.0e-07	1.5e-06	1.7e-06	1.8e-07	6.9e-08	1.6e-07	2.9e-07	3.4e-07
Fe-59	3.5e-07	1.2e-07	3.1e-07	6.1e-07	7.3e-07	6.9e-08	2.5e-08	6.1e-08	1.2e-07	1.4e-07
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.7e-06	3.1e-06	6.2e-06	1.0e-05	1.2e-05	1.3e-06	6.3e-07	1.2e-06	2.0e-06	2.3e-06
Sr-89	8.8e-06	4.0e-06	8.0e-06	1.4e-05	1.6e-05	1.7e-06	8.0e-07	1.6e-06	2.7e-06	3.1e-06
Sr-90	3.7e-03	1.8e-03	3.5e-03	5.7e-03	6.5e-03	7.4e-04	3.7e-04	7.0e-04	1.1e-03	1.3e-03
Y-91	5.7e-05	2.7e-05	5.3e-05	8.8e-05	1.0e-04	1.1e-05	5.3e-06	1.0e-05	1.8e-05	2.0e-05
Zr-93	8.0e-04	3.8e-04	7.5e-04	1.2e-03	1.4e-03	1.6e-04	7.8e-05	1.5e-04	2.3e-04	2.7e-04
Zr-95	7.1e-05	3.3e-05	6.5e-05	1.1e-04	1.3e-04	1.4e-05	6.7e-06	1.3e-05	2.1e-05	2.4e-05
Nb-93m	1.0e-04	4.9e-05	9.5e-05	1.5e-04	1.7e-04	2.0e-05	9.9e-06	1.9e-05	3.0e-05	3.4e-05
Nb-94	3.0e-03	1.4e-03	2.8e-03	4.5e-03	5.2e-03	5.9e-04	2.9e-04	5.6e-04	8.8e-04	1.0e-03
Nb-95	2.2e-06	9.4e-07	2.0e-06	3.6e-06	4.3e-06	4.4e-07	1.9e-07	3.9e-07	7.1e-07	8.3e-07
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.4e-06	3.7e-07	1.2e-06	2.6e-06	3.1e-06	2.8e-07	7.5e-08	2.4e-07	5.1e-07	6.0e-07
Sb-125	1.2e-05	3.3e-06	1.1e-05	2.2e-05	2.6e-05	2.4e-06	6.6e-07	2.1e-06	4.3e-06	5.1e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.8e-05	4.2e-06	1.6e-05	3.4e-05	4.1e-05	3.6e-06	8.4e-07	3.1e-06	6.6e-06	8.0e-06
I-129	1.5e-03	3.6e-04	1.3e-03	2.8e-03	3.3e-03	3.0e-04	7.2e-05	2.6e-04	5.4e-04	6.5e-04
I-131	4.4e-12	2.3e-13	2.1e-12	1.1e-11	1.6e-11	8.7e-13	4.6e-14	4.2e-13	2.3e-12	3.2e-12
Cs-134	2.4e-05	6.6e-06	2.1e-05	4.3e-05	5.1e-05	4.6e-06	1.3e-06	4.1e-06	8.3e-06	1.0e-05
Cs-135	3.0e-06	8.3e-07	2.6e-06	5.4e-06	6.4e-06	5.8e-07	1.7e-07	5.1e-07	1.0e-06	1.3e-06
Cs-137	2.0e-05	5.6e-06	1.7e-05	3.6e-05	4.3e-05	3.9e-06	1.1e-06	3.4e-06	7.0e-06	8.5e-06
Ba-133	2.1e-04	1.0e-04	2.0e-04	3.2e-04	3.6e-04	4.1e-05	2.0e-05	3.9e-05	6.1e-05	7.0e-05
Ce-139	5.7e-05	2.7e-05	5.3e-05	8.7e-05	9.9e-05	1.1e-05	5.5e-06	1.1e-05	1.7e-05	1.9e-05
Ce-141	3.8e-06	1.6e-06	3.4e-06	6.3e-06	7.5e-06	7.5e-07	3.2e-07	6.8e-07	1.2e-06	1.4e-06
Ce-144	2.1e-03	1.0e-03	1.9e-03	3.1e-03	3.6e-03	4.1e-04	2.0e-04	3.8e-04	6.1e-04	6.9e-04
Pm-147	3.3e-04	1.6e-04	3.1e-04	5.0e-04	5.7e-04	6.5e-05	3.2e-05	6.1e-05	9.7e-05	1.1e-04

Table F2.32 Normalized effective doses from inhalation: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.1e-04	1.5e-04	2.9e-04	4.7e-04	5.4e-04	6.1e-05	3.0e-05	5.8e-05	9.1e-05	1.0e-04
Eu-152	3.2e-03	1.5e-03	3.0e-03	4.8e-03	5.4e-03	6.2e-04	3.1e-04	5.9e-04	9.3e-04	1.1e-03
Eu-154	4.0e-03	1.9e-03	3.8e-03	6.1e-03	6.9e-03	7.9e-04	3.9e-04	7.5e-04	1.2e-03	1.3e-03
Eu-155	5.2e-04	2.5e-04	4.9e-04	7.9e-04	9.0e-04	1.0e-04	5.1e-05	9.7e-05	1.5e-04	1.7e-04
Gd-153	9.1e-05	4.4e-05	8.5e-05	1.4e-04	1.6e-04	1.8e-05	8.9e-06	1.7e-05	2.7e-05	3.1e-05
Tb-160	8.2e-05	3.9e-05	7.6e-05	1.3e-04	1.5e-04	1.6e-05	7.8e-06	1.5e-05	2.5e-05	2.8e-05
Tm-170	2.0e-04	9.4e-05	1.8e-04	3.0e-04	3.4e-04	3.8e-05	1.9e-05	3.6e-05	5.8e-05	6.6e-05
Tm-171	8.8e-05	4.3e-05	8.3e-05	1.3e-04	1.5e-04	1.7e-05	8.7e-06	1.6e-05	2.6e-05	3.0e-05
Ta-182	2.4e-04	1.2e-04	2.3e-04	3.7e-04	4.2e-04	4.8e-05	2.3e-05	4.5e-05	7.2e-05	8.2e-05
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.8e-01	1.3e-01	2.6e-01	4.2e-01	4.8e-01	5.5e-02	2.7e-02	5.2e-02	8.1e-02	9.2e-02
Ra-228	9.6e-01	4.6e-01	9.1e-01	1.5e+00	1.7e+00	1.9e-01	9.4e-02	1.8e-01	2.8e-01	3.2e-01
Ac-227	7.1e+00	3.4e+00	6.7e+00	1.1e+01	1.2e+01	1.4e+00	7.0e-01	1.3e+00	2.1e+00	2.4e+00
Th-228	3.3e+00	1.6e+00	3.2e+00	5.1e+00	5.8e+00	6.6e-01	3.3e-01	6.2e-01	9.8e-01	1.1e+00
Th-229	7.1e+00	3.5e+00	6.7e+00	1.1e+01	1.2e+01	1.4e+00	7.0e-01	1.3e+00	2.1e+00	2.4e+00
Th-230	8.7e-01	4.2e-01	8.2e-01	1.3e+00	1.5e+00	1.7e-01	8.5e-02	1.6e-01	2.5e-01	2.9e-01
Th-232	1.5e+00	7.2e-01	1.4e+00	2.3e+00	2.6e+00	2.9e-01	1.5e-01	2.8e-01	4.4e-01	5.0e-01
Pa-231	2.2e+00	1.1e+00	2.1e+00	3.3e+00	3.8e+00	4.3e-01	2.1e-01	4.1e-01	6.4e-01	7.3e-01
U-232	3.9e+00	1.9e+00	3.7e+00	5.9e+00	6.7e+00	7.7e-01	3.8e-01	7.3e-01	1.1e+00	1.3e+00
U-233	9.3e-01	4.0e-01	7.8e-01	1.3e+00	1.4e+00	1.8e-01	8.1e-02	1.5e-01	2.4e-01	2.8e-01
U-234	8.2e-01	3.9e-01	7.7e-01	1.2e+00	1.4e+00	1.6e-01	8.0e-02	1.5e-01	2.4e-01	2.7e-01
U-235	7.3e-01	3.5e-01	6.9e-01	1.1e+00	1.3e+00	1.4e-01	7.2e-02	1.4e-01	2.2e-01	2.5e-01
U-236	7.6e-01	3.7e-01	7.2e-01	1.1e+00	1.3e+00	1.5e-01	7.4e-02	1.4e-01	2.2e-01	2.5e-01
U-238	6.9e-01	3.3e-01	6.5e-01	1.0e+00	1.2e+00	1.4e-01	6.7e-02	1.3e-01	2.0e-01	2.3e-01
Np-237	1.8e+00	8.7e-01	1.7e+00	2.7e+00	3.1e+00	3.6e-01	1.8e-01	3.4e-01	5.3e-01	6.0e-01
Pu-236	7.9e-01	3.8e-01	7.5e-01	1.2e+00	1.4e+00	1.6e-01	7.8e-02	1.5e-01	2.3e-01	2.6e-01
Pu-238	1.3e+00	6.4e-01	1.2e+00	2.0e+00	2.3e+00	2.6e-01	1.3e-01	2.5e-01	3.9e-01	4.4e-01
Pu-239	1.0e+00	4.8e-01	9.4e-01	1.5e+00	1.7e+00	2.0e-01	9.8e-02	1.9e-01	2.9e-01	3.3e-01
Pu-240	1.0e+00	4.8e-01	9.4e-01	1.5e+00	1.7e+00	2.0e-01	9.8e-02	1.9e-01	2.9e-01	3.3e-01
Pu-241	1.5e-02	6.2e-03	1.2e-02	1.9e-02	2.2e-02	2.5e-03	1.3e-03	2.4e-03	3.8e-03	4.3e-03
Pu-242	9.3e-01	4.5e-01	8.8e-01	1.4e+00	1.6e+00	1.8e-01	9.1e-02	1.7e-01	2.7e-01	3.1e-01
Pu-244	8.9e-01	4.3e-01	8.4e-01	1.3e+00	1.5e+00	1.8e-01	8.7e-02	1.7e-01	2.6e-01	3.0e-01
Am-241	3.2e+00	1.6e+00	3.1e+00	4.9e+00	5.6e+00	6.4e-01	3.2e-01	6.0e-01	9.5e-01	1.1e+00
Am-242m	3.3e+00	1.6e+00	3.1e+00	4.9e+00	5.6e+00	6.4e-01	3.2e-01	6.1e-01	9.5e-01	1.1e+00
Am-243	3.3e+00	1.6e+00	3.1e+00	4.9e+00	5.6e+00	6.4e-01	3.2e-01	6.0e-01	9.5e-01	1.1e+00
Cm-242	1.8e-01	8.8e-02	1.7e-01	2.8e-01	3.2e-01	3.6e-02	1.8e-02	3.4e-02	5.4e-02	6.1e-02
Cm-243	2.4e+00	1.1e+00	2.2e+00	3.6e+00	4.1e+00	4.7e-01	2.3e-01	4.4e-01	6.9e-01	7.9e-01
Cm-244	2.0e+00	9.7e-01	1.9e+00	3.0e+00	3.4e+00	3.9e-01	2.0e-01	3.7e-01	5.9e-01	6.7e-01
Cm-245	3.3e+00	1.6e+00	3.1e+00	4.9e+00	5.6e+00	6.4e-01	3.2e-01	6.1e-01	9.5e-01	1.1e+00
Cm-246	3.3e+00	1.6e+00	3.1e+00	4.9e+00	5.6e+00	6.4e-01	3.2e-01	6.1e-01	9.5e-01	1.1e+00
Cm-247	3.0e+00	1.5e+00	2.8e+00	4.6e+00	5.2e+00	5.9e-01	2.9e-01	5.6e-01	8.8e-01	1.0e+00
Cm-248	1.1e+01	5.5e+00	1.1e+01	1.7e+01	2.0e+01	2.3e+00	1.1e+00	2.1e+00	3.3e+00	3.8e+00
Bk-249	1.3e-02	6.1e-03	1.2e-02	1.9e-02	2.2e-02	2.5e-03	1.2e-03	2.3e-03	3.7e-03	4.2e-03
Cf-248	5.1e-01	2.4e-01	4.8e-01	7.7e-01	8.8e-01	1.0e-01	5.0e-02	9.4e-02	1.5e-01	1.7e-01
Cf-249	5.4e+00	2.6e+00	5.1e+00	8.2e+00	9.3e+00	1.1e+00	5.3e-01	1.0e+00	1.6e+00	1.8e+00
Cf-250	2.6e+00	1.2e+00	2.4e+00	3.9e+00	4.4e+00	5.1e-01	2.5e-01	4.8e-01	7.5e-01	8.6e-01
Cf-251	5.5e+00	2.7e+00	5.2e+00	8.4e+00	9.6e+00	1.1e+00	5.4e-01	1.0e+00	1.6e+00	1.8e+00
Cf-252	1.3e+00	6.5e-01	1.3e+00	2.0e+00	2.3e+00	2.6e-01	1.3e-01	2.5e-01	3.9e-01	4.5e-01
Cf-254	2.2e-01	1.0e-01	2.1e-01	3.5e-01	4.0e-01	4.4e-02	2.1e-02	4.1e-02	6.8e-02	7.8e-02
Es-254	4.8e-01	2.3e-01	4.5e-01	7.3e-01	8.4e-01	9.5e-02	4.7e-02	9.0e-02	1.4e-01	1.6e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.33 Normalized effective doses from ingestion: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.8e-04	5.5e-05	5.6e-04	1.1e-03	1.2e-03	1.1e-04	1.1e-05	1.1e-04	2.1e-04	2.4e-04
P-32	2.4e-08	1.6e-09	1.7e-08	5.6e-08	7.3e-08	4.8e-09	3.2e-10	3.4e-09	1.1e-08	1.4e-08
S-35	9.1e-06	8.5e-07	8.7e-06	1.7e-05	1.9e-05	1.8e-06	1.7e-07	1.7e-06	3.3e-06	3.7e-06
Cl-36	9.4e-05	8.0e-06	7.4e-05	2.0e-04	2.5e-04	1.9e-05	1.2e-06	1.5e-05	4.0e-05	4.9e-05
K-40	1.3e-03	1.2e-04	1.3e-03	2.5e-03	2.8e-03	2.6e-04	2.5e-05	2.5e-04	4.8e-04	5.4e-04
Ca-41	1.2e-04	1.1e-05	1.1e-04	2.2e-04	2.4e-04	2.3e-05	2.2e-06	2.2e-05	4.2e-05	4.7e-05
Ca-45	1.2e-04	1.2e-05	1.2e-04	2.3e-04	2.5e-04	2.4e-05	2.3e-06	2.3e-05	4.4e-05	4.9e-05
Sc-46	1.0e-04	9.6e-06	9.7e-05	1.9e-04	2.1e-04	2.0e-05	1.9e-06	1.9e-05	3.7e-05	4.2e-05
Cr-51	2.4e-08	1.6e-09	1.8e-08	5.3e-08	6.8e-08	4.8e-09	3.1e-10	3.7e-09	1.0e-08	1.3e-08
Mn-53	1.1e-05	1.0e-06	1.1e-05	2.1e-05	2.3e-05	2.2e-06	2.1e-07	2.1e-06	4.0e-06	4.4e-06
Mn-54	1.6e-04	1.5e-05	1.6e-04	3.0e-04	3.3e-04	3.2e-05	3.0e-06	3.1e-05	5.9e-05	6.4e-05
Fe-55	3.0e-06	2.5e-07	2.6e-06	6.0e-06	7.1e-06	5.9e-07	5.0e-08	5.2e-07	1.2e-06	1.4e-06
Fe-59	6.7e-07	5.4e-08	5.7e-07	1.3e-06	1.6e-06	1.3e-07	1.1e-08	1.1e-07	2.6e-07	3.2e-07
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.3e-05	2.2e-06	2.1e-05	4.2e-05	4.8e-05	4.4e-06	4.2e-07	4.2e-06	8.3e-06	9.4e-06
Sr-89	5.5e-05	5.1e-06	5.1e-05	1.0e-04	1.2e-04	1.1e-05	1.0e-06	1.0e-05	2.0e-05	2.3e-05
Sr-90	1.2e-02	1.2e-03	1.2e-02	2.3e-02	2.5e-02	2.4e-03	2.3e-04	2.3e-03	4.4e-03	4.9e-03
Y-91	7.5e-05	7.1e-06	7.1e-05	1.4e-04	1.6e-04	1.5e-05	1.4e-06	1.4e-05	2.8e-05	3.2e-05
Zr-93	1.1e-04	1.1e-05	1.1e-04	2.1e-04	2.4e-04	2.3e-05	2.2e-06	2.2e-05	4.1e-05	4.6e-05
Zr-95	7.7e-05	7.3e-06	7.3e-05	1.4e-04	1.6e-04	1.5e-05	1.4e-06	1.5e-05	2.8e-05	3.2e-05
Nb-93m	4.7e-05	4.5e-06	4.6e-05	8.8e-05	9.8e-05	9.3e-06	8.9e-07	9.1e-06	1.7e-05	1.9e-05
Nb-94	6.9e-04	6.5e-05	6.7e-04	1.3e-03	1.4e-03	1.4e-04	1.3e-05	1.3e-04	2.5e-04	2.7e-04
Nb-95	3.3e-06	2.9e-07	3.0e-06	6.5e-06	7.6e-06	6.5e-07	5.9e-08	6.0e-07	1.3e-06	1.5e-06
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.5e-06	1.9e-07	2.0e-06	5.4e-06	6.6e-06	4.9e-07	3.7e-08	3.9e-07	1.1e-06	1.3e-06
Sb-125	1.3e-05	1.0e-06	1.1e-05	2.9e-05	3.5e-05	2.7e-06	2.0e-07	2.1e-06	5.6e-06	6.9e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.3e-04	8.4e-06	9.8e-05	2.7e-04	3.3e-04	2.5e-05	1.7e-06	1.9e-05	5.3e-05	6.5e-05
I-129	1.1e-02	7.4e-04	8.7e-03	2.4e-02	2.9e-02	2.2e-03	1.5e-04	1.7e-03	4.7e-03	5.7e-03
I-131	2.9e-11	6.7e-13	1.2e-11	7.9e-11	1.2e-10	5.8e-12	1.3e-13	2.4e-12	1.6e-11	2.4e-11
Cs-134	1.6e-04	1.2e-05	1.3e-04	3.3e-04	4.2e-04	3.1e-05	2.3e-06	2.5e-05	6.5e-05	8.1e-05
Cs-135	2.0e-05	1.5e-06	1.6e-05	4.3e-05	5.3e-05	4.0e-06	2.9e-07	3.2e-06	8.4e-06	1.0e-05
Cs-137	1.3e-04	9.5e-06	1.0e-04	2.7e-04	3.4e-04	2.5e-05	1.9e-06	2.1e-05	5.4e-05	6.7e-05
Ba-133	3.9e-04	3.7e-05	3.8e-04	7.2e-04	8.0e-04	7.7e-05	7.3e-06	7.5e-05	1.4e-04	1.6e-04
Ce-139	3.5e-05	3.4e-06	3.4e-05	6.6e-05	7.4e-05	7.0e-06	6.8e-07	6.7e-06	1.3e-05	1.4e-05
Ce-141	2.9e-06	2.6e-07	2.6e-06	5.8e-06	6.8e-06	5.8e-07	5.2e-08	5.2e-07	1.1e-06	1.3e-06
Ce-144	1.3e-03	1.2e-04	1.2e-03	2.3e-03	2.6e-03	2.5e-04	2.4e-05	2.4e-04	4.5e-04	5.0e-04
Pm-147	9.0e-05	8.6e-06	8.7e-05	1.7e-04	1.9e-04	1.8e-05	1.7e-06	1.7e-05	3.3e-05	3.6e-05

Table F2.33 Normalized effective doses from ingestion: Building road with slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.9e-05	3.8e-06	3.8e-05	7.3e-05	8.1e-05	7.8e-06	7.4e-07	7.5e-06	1.4e-05	1.6e-05
Eu-152	5.5e-04	5.3e-05	5.3e-04	1.0e-03	1.1e-03	1.1e-04	1.0e-05	1.1e-04	2.0e-04	2.2e-04
Eu-154	7.7e-04	7.4e-05	7.5e-04	1.4e-03	1.6e-03	1.5e-04	1.5e-05	1.5e-04	2.8e-04	3.1e-04
Eu-155	1.2e-04	1.1e-05	1.2e-04	2.2e-04	2.5e-04	2.3e-05	2.2e-06	2.3e-05	4.3e-05	4.8e-05
Gd-153	5.9e-05	5.7e-06	5.7e-05	1.1e-04	1.2e-04	1.2e-05	1.1e-06	1.1e-05	2.1e-05	2.4e-05
Tb-160	8.2e-05	7.8e-06	7.8e-05	1.5e-04	1.7e-04	1.6e-05	1.5e-06	1.5e-05	3.0e-05	3.4e-05
Tm-170	1.6e-04	1.6e-05	1.6e-04	3.0e-04	3.4e-04	3.2e-05	3.1e-06	3.1e-05	5.9e-05	6.6e-05
Tm-171	3.6e-05	3.4e-06	3.5e-05	6.7e-05	7.4e-05	7.1e-06	6.8e-07	6.9e-06	1.3e-05	1.4e-05
Ta-182	1.7e-04	1.6e-05	1.6e-04	3.0e-04	3.4e-04	3.2e-05	3.1e-06	3.1e-05	6.0e-05	6.7e-05
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.2e-01	1.1e-02	1.2e-01	2.2e-01	2.5e-01	2.3e-02	2.2e-03	2.3e-02	4.3e-02	4.8e-02
Ra-228	2.6e-01	2.5e-02	2.5e-01	4.8e-01	5.4e-01	5.1e-02	4.9e-03	5.0e-02	9.4e-02	1.0e-01
Ac-227	4.8e-01	4.5e-02	4.6e-01	8.9e-01	9.9e-01	9.5e-02	9.1e-03	9.2e-02	1.7e-01	1.9e-01
Th-228	3.5e-02	3.3e-03	3.4e-02	6.4e-02	7.1e-02	6.8e-03	6.6e-04	6.6e-03	1.3e-02	1.4e-02
Th-229	1.3e-01	1.2e-02	1.2e-01	2.4e-01	2.7e-01	2.5e-02	2.4e-03	2.5e-02	4.7e-02	5.2e-02
Th-230	3.5e-02	3.3e-03	3.4e-02	6.5e-02	7.3e-02	6.9e-03	6.7e-04	6.7e-03	1.3e-02	1.4e-02
Th-232	5.6e-02	5.3e-03	5.4e-02	1.0e-01	1.2e-01	1.1e-02	1.1e-03	1.1e-02	2.0e-02	2.2e-02
Pa-231	3.0e-01	2.8e-02	2.9e-01	5.5e-01	6.1e-01	5.8e-02	5.6e-03	5.7e-02	1.1e-01	1.2e-01
U-232	2.3e-02	2.2e-03	2.2e-02	4.3e-02	4.8e-02	4.6e-03	4.3e-04	4.4e-03	8.4e-03	9.3e-03
U-233	3.4e-03	3.3e-04	3.3e-03	6.4e-03	7.1e-03	6.8e-04	6.5e-05	6.6e-04	1.2e-03	1.4e-03
U-234	3.4e-03	3.2e-04	3.3e-03	6.2e-03	6.9e-03	6.6e-04	6.3e-05	6.4e-04	1.2e-03	1.3e-03
U-235	3.5e-03	3.3e-04	3.4e-03	6.5e-03	7.2e-03	6.9e-04	6.6e-05	6.7e-04	1.3e-03	1.4e-03
U-236	3.2e-03	3.0e-04	3.1e-03	5.9e-03	6.6e-03	6.3e-04	6.0e-05	6.1e-04	1.2e-03	1.3e-03
U-238	4.5e-03	4.2e-04	4.3e-03	8.3e-03	9.2e-03	8.8e-04	8.4e-05	8.5e-04	1.6e-03	1.8e-03
Np-237	4.5e-02	4.3e-03	4.3e-02	8.3e-02	9.2e-02	8.8e-03	8.4e-04	8.6e-03	1.6e-02	1.8e-02
Pu-236	3.0e-02	2.9e-03	2.9e-02	5.6e-02	6.2e-02	6.0e-03	5.7e-04	5.8e-03	1.1e-02	1.2e-02
Pu-238	9.3e-02	8.8e-03	9.0e-02	1.7e-01	1.9e-01	1.8e-02	1.8e-03	1.8e-02	3.3e-02	3.7e-02
Pu-239	1.0e-01	9.7e-03	9.8e-02	1.9e-01	2.1e-01	2.0e-02	1.9e-03	1.9e-02	3.6e-02	4.1e-02
Pu-240	1.0e-01	9.7e-03	9.8e-02	1.9e-01	2.1e-01	2.0e-02	1.9e-03	1.9e-02	3.6e-02	4.1e-02
Pu-241	1.9e-03	1.8e-04	1.9e-03	3.8e-03	4.0e-03	3.8e-04	3.6e-05	3.7e-04	6.9e-04	7.7e-04
Pu-242	9.7e-02	9.3e-03	9.4e-02	1.8e-01	2.0e-01	1.9e-02	1.8e-03	1.9e-02	3.5e-02	3.9e-02
Pu-244	9.8e-02	9.3e-03	9.4e-02	1.8e-01	2.0e-01	1.9e-02	1.9e-03	1.9e-02	3.5e-02	3.9e-02
Am-241	8.1e-02	7.7e-03	7.8e-02	1.5e-01	1.7e-01	1.6e-02	1.5e-03	1.5e-02	2.9e-02	3.2e-02
Am-242m	8.1e-02	7.8e-03	7.8e-02	1.5e-01	1.7e-01	1.6e-02	1.5e-03	1.6e-02	2.9e-02	3.3e-02
Am-243	8.1e-02	7.8e-03	7.8e-02	1.5e-01	1.7e-01	1.6e-02	1.5e-03	1.6e-02	2.9e-02	3.3e-02
Cm-242	2.2e-03	2.1e-04	2.1e-03	4.1e-03	4.6e-03	4.4e-04	4.2e-05	4.2e-04	8.0e-04	8.9e-04
Cm-243	6.0e-02	5.6e-03	5.8e-02	1.1e-01	1.2e-01	1.2e-02	1.1e-03	1.1e-02	2.2e-02	2.4e-02
Cm-244	4.7e-02	4.5e-03	4.6e-02	8.8e-02	9.8e-02	9.4e-03	8.9e-04	9.1e-03	1.7e-02	1.9e-02
Cm-245	8.5e-02	8.0e-03	8.2e-02	1.6e-01	1.7e-01	1.7e-02	1.6e-03	1.6e-02	3.1e-02	3.4e-02
Cm-246	8.5e-02	8.0e-03	8.2e-02	1.6e-01	1.7e-01	1.7e-02	1.6e-03	1.6e-02	3.1e-02	3.4e-02
Cm-247	7.7e-02	7.2e-03	7.5e-02	1.4e-01	1.6e-01	1.5e-02	1.4e-03	1.5e-02	2.8e-02	3.1e-02
Cm-248	3.1e-01	2.9e-02	3.0e-01	5.8e-01	6.4e-01	6.1e-02	5.8e-03	6.0e-02	1.1e-01	1.2e-01
Bk-249	3.8e-04	3.6e-05	3.7e-04	7.0e-04	7.8e-04	7.4e-05	7.1e-06	7.2e-05	1.4e-04	1.5e-04
Cf-248	8.1e-03	7.8e-04	7.9e-03	1.5e-02	1.7e-02	1.6e-03	1.5e-04	1.5e-03	2.9e-03	3.2e-03
Cf-249	1.4e-01	1.3e-02	1.4e-01	2.6e-01	2.9e-01	2.8e-02	2.7e-03	2.7e-02	5.1e-02	5.7e-02
Cf-250	6.3e-02	6.0e-03	6.1e-02	1.2e-01	1.3e-01	1.2e-02	1.2e-03	1.2e-02	2.3e-02	2.5e-02
Cf-251	1.5e-01	1.4e-02	1.4e-01	2.7e-01	3.0e-01	2.9e-02	2.7e-03	2.8e-02	5.3e-02	5.8e-02
Cf-252	3.1e-02	3.0e-03	3.0e-02	5.8e-02	6.4e-02	6.1e-03	5.9e-04	5.9e-03	1.1e-02	1.2e-02
Cf-254	1.4e-02	1.3e-03	1.3e-02	2.6e-02	2.9e-02	2.7e-03	2.5e-04	2.6e-03	5.0e-03	5.7e-03
Es-254	8.2e-03	7.8e-04	7.9e-03	1.5e-02	1.7e-02	1.6e-03	1.5e-04	1.6e-03	2.9e-03	3.3e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.34 Normalized effective doses from all pathways: Slag basement

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.2e+00	1.7e-01	7.2e-01	2.3e+00	3.6e+00	2.4e-01	3.4e-02	1.4e-01	4.6e-01	7.1e-01
P-32	7.1e-08	1.7e-10	7.0e-09	1.8e-07	3.2e-07	1.4e-08	3.4e-11	1.4e-09	3.5e-08	6.3e-08
S-35	2.1e-07	2.6e-09	1.2e-07	4.1e-07	6.4e-07	4.1e-08	5.1e-09	2.3e-08	8.2e-08	1.2e-07
Cl-36	1.6e-04	1.5e-05	8.7e-05	3.3e-04	5.1e-04	3.2e-05	3.0e-06	1.7e-05	6.5e-05	9.9e-05
K-40	1.2e-01	1.7e-02	7.0e-02	2.3e-01	3.6e-01	2.4e-02	3.3e-03	1.4e-02	4.5e-02	6.9e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	3.9e-06	5.5e-07	2.3e-06	7.7e-06	1.2e-05	7.8e-07	1.1e-07	4.5e-07	1.5e-06	2.3e-06
Sc-46	1.9e-01	2.4e-02	1.1e-01	3.8e-01	5.8e-01	3.8e-02	4.6e-03	2.1e-02	7.5e-02	1.1e-01
Cr-51	2.1e-05	5.1e-07	5.8e-06	4.7e-05	8.6e-05	4.1e-06	1.0e-07	1.2e-06	9.3e-06	1.7e-05
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.8e-01	6.6e-02	2.8e-01	9.1e-01	1.4e+00	9.4e-02	1.3e-02	5.5e-02	1.8e-01	2.8e-01
Fe-55	2.8e-12	2.8e-13	1.6e-12	5.6e-12	8.6e-12	5.5e-13	5.6e-14	3.2e-13	1.1e-12	1.7e-12
Fe-59	4.9e-04	3.1e-05	2.1e-04	1.1e-03	1.7e-03	9.6e-05	6.1e-06	4.2e-05	2.1e-04	3.3e-04
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.3e-02	2.5e-03	1.2e-02	4.7e-02	7.1e-02	4.5e-03	4.9e-04	2.4e-03	9.2e-03	1.4e-02
Sr-89	4.6e-05	4.2e-06	2.3e-05	9.7e-05	1.5e-04	9.1e-06	8.4e-07	4.5e-06	1.9e-05	3.0e-05
Sr-90	6.9e-03	9.7e-04	4.1e-03	1.3e-02	2.0e-02	1.4e-03	1.9e-04	8.0e-04	2.6e-03	4.0e-03
Y-91	2.1e-04	2.2e-05	1.1e-04	4.3e-04	6.6e-04	4.1e-05	4.3e-06	2.1e-05	8.5e-05	1.3e-04
Zr-93	8.7e-06	1.2e-06	5.1e-06	1.6e-05	2.6e-05	1.7e-06	2.4e-07	1.0e-06	3.3e-06	5.1e-06
Zr-95	1.0e-01	1.2e-02	5.6e-02	2.1e-01	3.2e-01	2.0e-02	2.3e-03	1.1e-02	4.1e-02	6.3e-02
Nb-93m	8.6e-06	1.2e-06	5.1e-06	1.6e-05	2.6e-05	1.7e-06	2.4e-07	1.0e-06	3.2e-06	5.0e-06
Nb-94	2.2e+00	3.1e-01	1.3e+00	4.1e+00	6.5e+00	4.3e-01	6.1e-02	2.5e-01	8.2e-01	1.3e+00
Nb-95	4.5e-03	2.6e-04	1.8e-03	1.0e-02	1.6e-02	8.8e-04	5.2e-05	3.5e-04	2.0e-03	3.2e-03
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.3e-03	1.5e-04	1.0e-03	4.9e-03	7.7e-03	4.4e-04	3.0e-05	2.0e-04	9.7e-04	1.5e-03
Sb-125	1.3e-02	1.2e-03	7.2e-03	2.7e-02	4.2e-02	2.6e-03	2.3e-04	1.4e-03	5.4e-03	8.3e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.0e-05	7.2e-07	4.7e-06	2.2e-05	3.4e-05	2.0e-06	1.4e-07	9.2e-07	4.3e-06	6.6e-06
I-129	3.0e-04	2.7e-05	1.6e-04	6.1e-04	9.4e-04	6.0e-05	5.4e-06	3.2e-05	1.2e-04	1.9e-04
I-131	1.3e-08	1.8e-13	1.0e-10	2.5e-08	5.9e-08	2.5e-09	3.5e-14	2.0e-11	4.9e-09	1.2e-08
Cs-134	3.8e-02	3.8e-03	2.1e-02	7.7e-02	1.2e-01	7.5e-03	7.6e-04	4.1e-03	1.5e-02	2.4e-02
Cs-135	5.8e-07	5.9e-08	3.2e-07	1.2e-06	1.9e-06	1.1e-07	1.2e-08	6.3e-08	2.3e-07	3.7e-07
Cs-137	1.9e-02	1.9e-03	1.0e-02	3.8e-02	6.0e-02	3.7e-03	3.8e-04	2.0e-03	7.4e-03	1.2e-02
Ba-133	4.1e-01	5.8e-02	2.4e-01	7.8e-01	1.2e+00	8.1e-02	1.2e-02	4.8e-02	1.6e-01	2.4e-01
Ce-139	2.3e-02	3.2e-03	1.4e-02	4.5e-02	6.9e-02	4.6e-03	6.4e-04	2.7e-03	8.9e-03	1.4e-02
Ce-141	2.0e-04	1.0e-05	7.7e-05	4.6e-04	7.4e-04	4.0e-05	2.0e-06	1.5e-05	8.9e-05	1.5e-04
Ce-144	2.6e-02	3.7e-03	1.5e-02	5.0e-02	7.9e-02	5.2e-03	7.5e-04	3.1e-03	1.0e-02	1.5e-02
Pm-147	8.8e-06	1.2e-06	5.1e-06	1.7e-05	2.6e-05	1.7e-06	2.5e-07	1.0e-06	3.3e-06	5.0e-06

Table F2.34 Normalized effective doses from all pathways: Slag basement

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-07	2.4e-08	9.8e-08	3.1e-07	4.9e-07	3.3e-08	4.7e-09	1.9e-08	6.3e-08	9.6e-08
Eu-152	1.5e+00	2.1e-01	8.8e-01	2.8e+00	4.5e+00	3.0e-01	4.2e-02	1.7e-01	5.7e-01	8.7e-01
Eu-154	1.4e+00	2.0e-01	8.4e-01	2.7e+00	4.2e+00	2.8e-01	4.0e-02	1.7e-01	5.4e-01	8.2e-01
Eu-155	2.8e-02	4.0e-03	1.7e-02	5.4e-02	8.4e-02	5.6e-03	8.0e-04	3.3e-03	1.1e-02	1.6e-02
Gd-153	1.5e-02	2.1e-03	8.8e-03	2.9e-02	4.5e-02	3.0e-03	4.3e-04	1.7e-03	5.7e-03	8.7e-03
Tb-160	7.2e-02	8.4e-03	3.9e-02	1.5e-01	2.2e-01	1.4e-02	1.7e-03	7.7e-03	2.9e-02	4.4e-02
Tm-170	3.3e-04	4.4e-05	1.9e-04	6.3e-04	9.7e-04	6.4e-05	8.8e-06	3.7e-05	1.2e-04	1.9e-04
Tm-171	1.0e-04	1.5e-05	6.1e-05	2.0e-04	3.1e-04	2.1e-05	3.0e-06	1.2e-05	3.9e-05	6.1e-05
Ta-182	2.3e-01	3.0e-02	1.3e-01	4.4e-01	6.8e-01	4.4e-02	6.0e-03	2.5e-02	8.7e-02	1.3e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.4e+00	3.4e-01	1.4e+00	4.5e+00	7.2e+00	4.8e-01	6.8e-02	2.8e-01	9.1e-01	1.4e+00
Ra-228	1.9e+00	2.7e-01	1.1e+00	3.6e+00	5.7e+00	3.8e-01	5.4e-02	2.2e-01	7.2e-01	1.1e+00
Ac-227	4.6e-01	6.5e-02	2.7e-01	8.7e-01	1.4e+00	9.1e-02	1.3e-02	5.4e-02	1.7e-01	2.7e-01
Th-228	1.4e+00	2.0e-01	8.2e-01	2.6e+00	4.1e+00	2.7e-01	3.9e-02	1.6e-01	5.3e-01	8.1e-01
Th-229	3.4e-01	4.7e-02	2.0e-01	6.3e-01	9.9e-01	6.6e-02	9.4e-03	3.9e-02	1.3e-01	1.9e-01
Th-230	1.0e-01	1.5e-02	6.1e-02	1.9e-01	3.1e-01	2.0e-02	2.9e-03	1.2e-02	3.9e-02	6.0e-02
Th-232	3.2e+00	4.5e-01	1.9e+00	6.1e+00	9.5e+00	6.3e-01	9.0e-02	3.7e-01	1.2e+00	1.8e+00
Pa-231	5.0e-01	7.0e-02	2.9e-01	9.3e-01	1.5e+00	9.8e-02	1.4e-02	5.8e-02	1.9e-01	2.9e-01
U-232	1.8e+00	2.6e-01	1.1e+00	3.4e+00	5.4e+00	3.6e-01	5.1e-02	2.1e-01	6.8e-01	1.1e+00
U-233	3.4e-03	4.8e-04	2.0e-03	6.4e-03	1.0e-02	6.7e-04	9.5e-05	3.9e-04	1.3e-03	2.0e-03
U-234	1.1e-04	1.6e-05	6.7e-05	2.1e-04	3.4e-04	2.2e-05	3.2e-06	1.3e-05	4.3e-05	6.6e-05
U-235	1.7e-01	2.4e-02	1.0e-01	3.2e-01	5.1e-01	3.4e-02	4.8e-03	2.0e-02	6.5e-02	1.0e-01
U-236	3.1e-05	4.4e-06	1.8e-05	5.9e-05	9.3e-05	6.2e-06	8.8e-07	3.6e-06	1.2e-05	1.8e-05
U-238	3.5e-02	4.9e-03	2.0e-02	6.5e-02	1.0e-01	6.8e-03	9.7e-04	4.0e-03	1.3e-02	2.0e-02
Np-237	2.6e-01	3.6e-02	1.5e-01	4.8e-01	7.6e-01	5.1e-02	7.2e-03	3.0e-02	9.7e-02	1.5e-01
Pu-236	7.2e-02	1.0e-02	4.2e-02	1.3e-01	2.1e-01	1.4e-02	2.0e-03	8.3e-03	2.7e-02	4.2e-02
Pu-238	1.7e-05	2.4e-06	9.9e-06	3.2e-05	5.0e-05	3.3e-06	4.7e-07	2.0e-06	6.4e-06	9.8e-06
Pu-239	6.0e-05	8.5e-06	3.5e-05	1.1e-04	1.8e-04	1.2e-05	1.7e-06	7.0e-06	2.3e-05	3.5e-05
Pu-240	1.7e-05	2.4e-06	9.7e-06	3.1e-05	5.0e-05	3.3e-06	4.6e-07	1.9e-06	6.2e-06	9.6e-06
Pu-241	1.9e-04	2.1e-05	1.1e-04	3.5e-04	5.6e-04	3.7e-05	5.3e-06	2.2e-05	7.1e-05	1.1e-04
Pu-242	1.5e-05	2.1e-06	8.8e-06	2.8e-05	4.5e-05	2.9e-06	4.2e-07	1.7e-06	5.6e-06	8.7e-06
Pu-244	4.4e-01	6.3e-02	2.6e-01	8.3e-01	1.3e+00	8.8e-02	1.2e-02	5.2e-02	1.7e-01	2.6e-01
Am-241	6.4e-03	9.0e-04	3.7e-03	1.2e-02	1.9e-02	1.3e-03	1.8e-04	7.4e-04	2.4e-03	3.7e-03
Am-242m	1.4e-02	1.9e-03	8.0e-03	2.6e-02	4.0e-02	2.7e-03	3.8e-04	1.6e-03	5.1e-03	7.9e-03
Am-243	1.9e-01	2.7e-02	1.1e-01	3.6e-01	5.6e-01	3.7e-02	5.3e-03	2.2e-02	7.1e-02	1.1e-01
Cm-242	4.1e-06	5.6e-07	2.4e-06	7.9e-06	1.2e-05	8.0e-07	1.1e-07	4.7e-07	1.5e-06	2.4e-06
Cm-243	1.2e-01	1.7e-02	7.0e-02	2.3e-01	3.6e-01	2.4e-02	3.4e-03	1.4e-02	4.5e-02	6.9e-02
Cm-244	1.4e-05	2.0e-06	8.4e-06	2.7e-05	4.3e-05	2.8e-06	4.0e-07	1.7e-06	5.4e-06	8.2e-06
Cm-245	7.5e-02	1.1e-02	4.4e-02	1.4e-01	2.2e-01	1.5e-02	2.1e-03	8.7e-03	2.8e-02	4.3e-02
Cm-246	8.3e-06	1.2e-06	4.8e-06	1.6e-05	2.5e-05	1.6e-06	2.3e-07	9.6e-07	3.1e-06	4.7e-06
Cm-247	4.2e-01	6.0e-02	2.5e-01	8.0e-01	1.3e+00	8.3e-02	1.2e-02	4.9e-02	1.6e-01	2.4e-01
Cm-248	7.6e-06	1.1e-06	4.4e-06	1.4e-05	2.2e-05	1.5e-06	2.1e-07	8.8e-07	2.8e-06	4.3e-06
Bk-249	1.0e-03	1.4e-04	6.0e-04	1.9e-03	3.0e-03	2.0e-04	2.8e-05	1.2e-04	3.8e-04	5.9e-04
Cf-248	1.2e-05	1.6e-06	6.9e-06	2.2e-05	3.5e-05	2.3e-06	3.3e-07	1.4e-06	4.4e-06	6.8e-06
Cf-249	4.1e-01	5.9e-02	2.4e-01	7.8e-01	1.2e+00	8.1e-02	1.2e-02	4.8e-02	1.6e-01	2.4e-01
Cf-250	8.6e-06	1.2e-06	5.1e-06	1.6e-05	2.6e-05	1.7e-06	2.4e-07	1.0e-06	3.2e-06	5.0e-06
Cf-251	1.0e-01	1.5e-02	6.1e-02	2.0e-01	3.1e-01	2.0e-02	2.9e-03	1.2e-02	3.9e-02	6.0e-02
Cf-252	1.6e-05	2.3e-06	9.5e-06	3.1e-05	4.8e-05	3.2e-06	4.6e-07	1.9e-06	6.1e-06	9.4e-06
Cf-254	7.1e-01	7.4e-02	3.7e-01	1.4e+00	2.2e+00	1.4e-01	1.5e-02	7.2e-02	2.8e-01	4.4e-01
Es-254	5.1e-01	7.2e-02	3.0e-01	9.8e-01	1.5e+00	1.0e-01	1.4e-02	5.9e-02	1.9e-01	3.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.35 Normalized effective doses from all pathways: Driving on slag road

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.3e+00	2.1e-01	1.5e+00	2.0e+00	2.1e+00	2.6e-01	4.2e-02	3.0e-01	3.8e-01	4.0e-01
P-32	7.9e-10	7.4e-18	8.4e-11	2.4e-09	4.0e-09	1.6e-10	1.6e-18	1.7e-11	4.5e-10	8.0e-10
S-35	9.4e-08	2.2e-09	9.5e-08	1.8e-07	2.0e-07	1.9e-08	4.3e-10	1.9e-08	3.5e-08	3.9e-08
Cl-36	1.7e-04	2.3e-05	1.6e-04	3.4e-04	3.9e-04	3.4e-05	4.5e-06	3.1e-05	6.6e-05	7.5e-05
K-40	1.5e-01	2.7e-02	1.6e-01	2.2e-01	2.3e-01	2.9e-02	5.3e-03	3.3e-02	4.1e-02	4.4e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.1e-06	1.4e-07	2.3e-06	3.5e-06	3.7e-06	4.1e-07	2.9e-08	4.6e-07	6.7e-07	7.1e-07
Sc-46	9.1e-02	1.9e-03	9.1e-02	1.8e-01	2.0e-01	1.8e-02	3.8e-04	1.8e-02	3.4e-02	3.8e-02
Cr-51	1.7e-06	7.5e-11	7.2e-07	4.9e-06	7.1e-06	3.4e-07	1.5e-11	1.4e-07	9.5e-07	1.4e-06
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.3e-01	4.9e-02	4.8e-01	6.5e-01	6.9e-01	8.4e-02	9.6e-03	9.7e-02	1.3e-01	1.3e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.1e-04	1.6e-07	8.1e-05	2.8e-04	3.5e-04	2.2e-05	3.3e-08	1.6e-05	5.5e-05	7.0e-05
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	8.5e-03	6.4e-05	7.8e-03	1.8e-02	2.1e-02	1.7e-03	1.6e-05	1.5e-03	3.5e-03	4.0e-03
Sr-89	1.6e-05	5.5e-08	1.3e-05	3.7e-05	4.3e-05	3.2e-06	1.1e-08	2.6e-06	7.2e-06	8.4e-06
Sr-90	1.1e-02	2.0e-03	1.2e-02	1.6e-02	1.6e-02	2.2e-03	4.0e-04	2.5e-03	3.0e-03	3.2e-03
Y-91	7.7e-05	5.0e-07	6.8e-05	1.7e-04	1.9e-04	1.5e-05	1.0e-07	1.3e-05	3.3e-05	3.8e-05
Zr-93	1.4e-05	2.6e-08	1.6e-05	2.0e-05	2.1e-05	2.8e-06	5.2e-07	3.3e-06	3.9e-06	4.1e-06
Zr-95	4.0e-02	3.8e-04	3.7e-02	8.3e-02	9.5e-02	7.8e-03	7.5e-05	7.3e-03	1.6e-02	1.8e-02
Nb-93m	2.0e-05	3.5e-06	2.2e-05	2.8e-05	2.8e-05	3.9e-06	7.0e-07	4.5e-06	5.3e-06	5.5e-06
Nb-94	2.6e+00	4.7e-01	2.9e+00	3.6e+00	3.7e+00	5.1e-01	9.2e-02	5.8e-01	7.0e-01	7.3e-01
Nb-95	6.5e-04	2.7e-07	4.0e-04	1.7e-03	2.1e-03	1.3e-04	5.4e-08	8.0e-05	3.3e-04	4.2e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	7.8e-04	4.3e-06	5.8e-04	1.9e-03	2.3e-03	1.5e-04	8.5e-07	1.1e-04	3.7e-04	4.5e-04
Sb-125	1.4e-02	1.6e-03	1.3e-02	2.6e-02	3.0e-02	2.7e-03	3.2e-04	2.5e-03	5.1e-03	5.9e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	8.8e-06	4.3e-08	4.9e-06	1.6e-05	2.1e-05	1.3e-06	8.6e-09	9.7e-07	3.2e-06	4.0e-06
I-129	6.7e-04	8.5e-05	6.1e-04	1.3e-03	1.5e-03	1.3e-04	1.7e-05	1.2e-04	2.5e-04	2.9e-04
I-131	2.5e-12	7.9e-27	1.2e-14	4.0e-12	1.1e-11	4.9e-13	1.5e-27	2.4e-15	7.8e-13	2.2e-12
Cs-134	4.0e-02	4.5e-03	3.6e-02	7.7e-02	8.8e-02	7.8e-03	8.9e-04	7.1e-03	1.5e-02	1.7e-02
Cs-135	2.3e-07	3.0e-08	2.0e-07	4.3e-07	5.0e-07	4.5e-08	6.0e-09	4.1e-08	8.5e-08	9.7e-08
Cs-137	2.2e-02	2.9e-03	2.0e-02	4.2e-02	4.8e-02	4.3e-03	5.8e-04	3.9e-03	8.2e-03	9.3e-03
Ba-133	4.7e-01	8.3e-02	5.3e-01	8.6e-01	8.8e-01	9.3e-02	1.6e-02	1.1e-01	1.3e-01	1.3e-01
Ce-139	1.6e-02	9.0e-04	1.8e-02	2.8e-02	3.0e-02	3.2e-03	1.8e-04	3.5e-03	5.4e-03	5.8e-03
Ce-141	2.7e-05	6.3e-09	1.5e-05	7.1e-05	9.1e-05	5.3e-06	1.3e-09	3.1e-06	1.4e-05	1.8e-05
Ce-144	2.9e-02	3.2e-03	3.3e-02	4.4e-02	4.6e-02	5.7e-03	6.3e-04	6.6e-03	8.4e-03	8.8e-03
Pm-147	8.5e-06	1.4e-06	9.6e-06	1.2e-05	1.3e-05	1.7e-06	2.7e-07	2.0e-06	2.3e-06	2.4e-06

Table F2.35 Normalized effective doses from all pathways: Driving on slag road

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.9e-07	3.4e-08	2.1e-07	2.7e-07	2.7e-07	3.7e-08	6.7e-09	4.3e-08	5.1e-08	5.4e-08
Eu-152	1.7e+00	3.1e-01	1.9e+00	2.5e+00	2.5e+00	3.4e-01	6.1e-02	4.0e-01	4.7e-01	4.9e-01
Eu-154	1.8e+00	3.3e-01	2.1e+00	2.6e+00	2.7e+00	3.6e-01	6.4e-02	4.2e-01	5.0e-01	5.2e-01
Eu-155	3.8e-02	6.5e-03	4.2e-02	5.4e-02	5.5e-02	7.4e-03	1.3e-03	8.7e-03	1.0e-02	1.1e-02
Gd-153	1.5e-02	1.5e-03	1.7e-02	2.4e-02	2.5e-02	3.0e-03	3.0e-04	3.5e-03	4.6e-03	4.8e-03
Tb-160	3.0e-02	4.3e-04	2.9e-02	6.1e-02	6.9e-02	6.0e-03	8.2e-05	5.7e-03	1.2e-02	1.3e-02
Tm-170	3.4e-04	1.7e-05	3.7e-04	5.9e-04	6.4e-04	6.7e-05	3.4e-06	7.3e-05	1.1e-04	1.2e-04
Tm-171	1.6e-04	2.5e-05	1.8e-04	2.4e-04	2.4e-04	3.2e-05	4.9e-06	3.8e-05	4.5e-05	4.7e-05
Ta-182	1.4e-01	5.9e-03	1.5e-01	2.5e-01	2.7e-01	2.7e-02	1.2e-03	2.9e-02	4.8e-02	5.2e-02
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.0e+00	5.4e-01	3.3e+00	4.2e+00	4.3e+00	5.9e-01	1.1e-01	6.8e-01	8.1e-01	8.5e-01
Ra-228	2.6e+00	4.7e-01	2.9e+00	3.6e+00	3.7e+00	5.1e-01	9.3e-02	5.9e-01	7.0e-01	7.3e-01
Ac-227	5.1e-01	9.0e-02	5.7e-01	7.1e-01	7.3e-01	9.9e-02	1.8e-02	1.1e-01	1.4e-01	1.4e-01
Th-228	1.7e+00	2.6e-01	1.9e+00	2.4e+00	2.5e+00	3.3e-01	5.0e-02	3.9e-01	4.6e-01	4.8e-01
Th-229	4.2e-01	7.5e-02	4.6e-01	5.8e-01	6.0e-01	8.2e-02	1.5e-02	9.4e-02	1.1e-01	1.2e-01
Th-230	3.9e-02	7.2e-03	4.4e-02	5.5e-02	5.7e-02	7.8e-03	1.4e-03	8.9e-03	1.1e-02	1.1e-02
Th-232	4.2e+00	7.5e-01	4.7e+00	5.9e+00	6.0e+00	8.2e-01	1.5e-01	9.5e-01	1.1e+00	1.2e+00
Pa-231	3.8e-01	6.8e-02	4.2e-01	5.3e-01	5.4e-01	7.4e-02	1.4e-02	8.5e-02	1.0e-01	1.1e-01
U-232	2.5e+00	4.5e-01	2.8e+00	3.5e+00	3.6e+00	4.9e-01	8.9e-02	5.6e-01	6.7e-01	7.0e-01
U-233	1.5e-03	2.8e-04	1.7e-03	2.2e-03	2.2e-03	3.0e-04	5.6e-05	3.5e-04	4.2e-04	4.4e-04
U-234	1.0e-04	1.9e-05	1.1e-04	1.4e-04	1.5e-04	2.0e-05	3.7e-06	2.3e-05	2.8e-05	2.9e-05
U-235	2.0e-01	3.5e-02	2.2e-01	2.7e-01	2.8e-01	3.9e-02	7.0e-03	4.4e-02	5.3e-02	5.6e-02
U-236	5.0e-05	9.1e-06	5.6e-05	7.1e-05	7.3e-05	9.8e-06	1.8e-06	1.1e-05	1.4e-05	1.4e-05
U-238	3.9e-02	7.0e-03	4.3e-02	5.4e-02	5.6e-02	7.6e-03	1.4e-03	8.8e-03	1.0e-02	1.1e-02
Np-237	2.9e-01	5.2e-02	3.2e-01	4.0e-01	4.1e-01	5.6e-02	1.0e-02	6.5e-02	7.7e-02	8.1e-02
Pu-236	9.7e-02	1.8e-02	1.1e-01	1.4e-01	1.4e-01	1.9e-02	3.5e-03	2.2e-02	2.6e-02	2.8e-02
Pu-238	3.3e-05	5.9e-06	3.6e-05	4.6e-05	4.7e-05	6.4e-06	1.2e-06	7.4e-06	8.8e-06	9.3e-06
Pu-239	7.4e-05	1.4e-05	8.3e-05	1.0e-04	1.1e-04	1.5e-05	2.7e-06	1.7e-05	2.0e-05	2.1e-05
Pu-240	3.2e-05	5.8e-06	3.6e-05	4.5e-05	4.6e-05	6.3e-06	1.1e-06	7.2e-06	8.6e-06	9.0e-06
Pu-241	2.6e-04	4.8e-05	2.9e-04	3.7e-04	3.8e-04	5.1e-05	9.3e-06	5.9e-05	7.1e-05	7.4e-05
Pu-242	2.8e-05	5.1e-06	3.1e-05	3.9e-05	4.1e-05	5.5e-06	1.0e-06	6.4e-06	7.6e-06	8.0e-06
Pu-244	5.4e-01	9.8e-02	6.0e-01	7.6e-01	7.8e-01	1.1e-01	1.9e-02	1.2e-01	1.5e-01	1.5e-01
Am-241	1.0e-02	1.9e-03	1.2e-02	1.5e-02	1.5e-02	2.1e-03	3.8e-04	2.4e-03	2.8e-03	3.0e-03
Am-242m	1.7e-02	3.1e-03	1.9e-02	2.4e-02	2.5e-02	3.4e-03	6.2e-04	3.9e-03	4.7e-03	4.9e-03
Am-243	2.3e-01	4.2e-02	2.6e-01	3.2e-01	3.3e-01	4.5e-02	8.3e-03	5.2e-02	6.2e-02	6.5e-02
Cm-242	5.1e-06	3.9e-07	5.7e-06	8.5e-06	9.1e-06	1.0e-06	7.6e-08	1.1e-06	1.6e-06	1.7e-06
Cm-243	1.5e-01	2.6e-02	1.6e-01	2.1e-01	2.1e-01	2.9e-02	5.2e-03	3.3e-02	4.0e-02	4.1e-02
Cm-244	2.4e-05	4.3e-06	2.7e-05	3.4e-05	3.5e-05	4.7e-06	8.5e-07	5.5e-06	6.5e-06	6.8e-06
Cm-245	8.7e-02	1.6e-02	9.7e-02	1.2e-01	1.2e-01	1.7e-02	3.1e-03	2.0e-02	2.3e-02	2.5e-02
Cm-246	2.3e-05	4.3e-06	2.6e-05	3.3e-05	3.4e-05	4.6e-06	8.4e-07	5.3e-06	6.3e-06	6.6e-06
Cm-247	4.9e-01	8.9e-02	5.4e-01	6.8e-01	7.0e-01	9.6e-02	1.7e-02	1.1e-01	1.3e-01	1.4e-01
Cm-248	1.8e-05	3.2e-06	2.0e-05	2.5e-05	2.6e-05	3.5e-06	6.3e-07	4.0e-06	4.8e-06	5.0e-06
Bk-249	1.2e-03	2.2e-04	1.3e-03	1.7e-03	1.7e-03	2.4e-04	4.3e-05	2.7e-04	3.2e-04	3.4e-04
Cf-248	9.8e-06	1.3e-06	1.1e-05	1.5e-05	1.5e-05	1.9e-06	2.5e-07	2.3e-06	2.8e-06	2.9e-06
Cf-249	4.8e-01	8.8e-02	5.4e-01	6.8e-01	7.0e-01	9.6e-02	1.7e-02	1.1e-01	1.3e-01	1.4e-01
Cf-250	2.2e-05	3.9e-06	2.4e-05	3.1e-05	3.2e-05	4.3e-06	7.7e-07	5.0e-06	5.9e-06	6.2e-06
Cf-251	1.4e-01	2.4e-02	1.5e-01	1.9e-01	2.0e-01	2.7e-02	4.8e-03	3.1e-02	3.7e-02	3.8e-02
Cf-252	2.7e-05	4.4e-06	3.0e-05	3.9e-05	4.0e-05	5.3e-06	8.6e-07	6.2e-06	7.4e-06	7.7e-06
Cf-254	6.3e-10	4.8e-12	5.7e-10	1.4e-09	1.6e-09	1.3e-10	9.4e-13	1.1e-10	2.7e-10	3.1e-10
Es-254	4.4e-01	4.8e-02	5.0e-01	6.8e-01	7.2e-01	8.7e-02	9.5e-03	1.0e-01	1.3e-01	1.4e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.36 Normalized effective doses from all pathways: Sailor operations

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	8.2e-07	1.1e-07	4.8e-07	1.7e-06	2.6e-06	1.6e-07	2.1e-08	9.5e-08	3.2e-07	5.2e-07
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	2.9e-18	3.3e-17	1.4e-18	5.9e-18	9.6e-18	5.7e-17	6.6e-18	2.7e-17	1.2e-18	1.9e-18
S-35	7.1e-10	1.1e-10	4.2e-10	1.4e-09	2.2e-09	1.4e-10	2.2e-11	8.3e-11	2.7e-10	4.3e-10
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	6.0e-09	8.8e-10	3.3e-09	1.2e-08	1.8e-08	1.2e-09	1.7e-10	6.6e-10	2.3e-09	3.5e-09
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-01	1.4e-02	6.5e-02	2.3e-01	3.5e-01	2.3e-02	2.8e-03	1.3e-02	4.5e-02	7.0e-02
Fe-55	8.7e-11	1.2e-11	5.2e-11	1.6e-10	2.9e-10	1.7e-11	2.4e-12	1.0e-11	3.2e-11	5.0e-11
Fe-59	2.1e-04	3.0e-05	1.2e-04	3.9e-04	6.3e-04	4.1e-05	6.0e-06	2.4e-05	7.8e-05	1.2e-04
Co-56	5.6e-02	7.8e-03	3.3e-02	1.1e-01	1.8e-01	1.1e-02	1.6e-03	6.6e-03	2.1e-02	3.6e-02
Co-57	1.7e-02	2.3e-03	1.0e-02	3.1e-02	5.6e-02	3.3e-03	4.6e-04	2.0e-03	6.2e-03	1.2e-02
Co-58	6.6e-03	9.3e-04	3.9e-03	1.2e-02	2.1e-02	1.3e-03	1.8e-04	7.7e-04	2.4e-03	4.2e-03
Co-60	1.6e+01	2.1e+00	9.3e+00	2.9e+01	5.1e+01	3.1e+00	4.2e-01	1.8e+00	5.7e+00	1.1e+01
Ni-59	9.5e-05	1.3e-05	5.6e-05	1.7e-04	3.1e-04	1.9e-05	2.5e-06	1.1e-05	3.5e-05	6.6e-05
Ni-63	8.6e-09	1.1e-09	5.1e-09	1.6e-08	2.8e-08	1.7e-09	2.3e-10	1.0e-09	3.2e-09	5.9e-09
Zn-65	4.1e-02	4.6e-03	2.3e-02	8.3e-02	1.2e-01	8.1e-03	9.2e-04	4.6e-03	1.6e-02	2.5e-02
As-73	1.6e-07	2.4e-08	9.6e-08	3.1e-07	5.0e-07	3.2e-08	4.7e-09	1.9e-08	6.0e-08	9.8e-08
Se-75	7.4e-04	1.1e-04	4.3e-04	1.4e-03	2.2e-03	1.5e-04	2.3e-05	8.5e-05	2.8e-04	4.4e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	4.3e-06	5.7e-07	2.5e-06	7.9e-06	1.4e-05	8.4e-07	1.1e-07	5.0e-07	1.6e-06	2.9e-06
Tc-97	5.0e-06	6.7e-07	3.0e-06	9.3e-06	1.6e-05	9.8e-07	1.3e-07	5.9e-07	1.8e-06	3.4e-06
Tc-97m	3.4e-07	4.8e-08	2.0e-07	6.5e-07	1.1e-06	6.7e-08	9.6e-09	4.0e-08	1.3e-07	2.2e-07
Tc-99	5.5e-05	7.5e-06	3.3e-05	1.0e-04	1.8e-04	1.1e-05	1.5e-06	6.5e-06	2.0e-05	3.8e-05
Ru-103	1.7e-05	2.5e-06	1.0e-05	3.3e-05	5.2e-05	3.4e-06	5.0e-07	2.0e-06	6.6e-06	1.0e-05
Ru-106	3.7e-01	5.1e-02	2.2e-01	6.8e-01	1.2e+00	7.3e-02	1.0e-02	4.4e-02	1.3e-01	2.6e-01
Ag-108m	8.8e+00	1.2e+00	5.2e+00	1.6e+01	2.8e+01	1.7e+00	2.4e-01	1.0e+00	3.2e+00	5.9e+00
Ag-110m	2.2e+00	3.1e-01	1.3e+00	4.1e+00	7.1e+00	4.3e-01	6.1e-02	2.5e-01	8.0e-01	1.5e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	1.7e-02	2.4e-03	1.0e-02	3.2e-02	5.5e-02	3.3e-03	4.7e-04	2.0e-03	6.2e-03	1.1e-02
Sb-124	3.8e-03	5.6e-04	2.3e-03	7.2e-03	1.2e-02	7.6e-04	1.1e-04	4.5e-04	1.4e-03	2.4e-03
Sb-125	1.3e+00	1.8e-01	7.5e-01	2.4e+00	4.1e+00	2.5e-01	3.5e-02	1.5e-01	4.7e-01	8.6e-01
Te-123m	1.4e-04	2.1e-05	7.9e-05	2.6e-04	4.1e-04	2.7e-05	4.3e-06	1.6e-05	5.2e-05	8.3e-05
Te-127m	1.0e-05	1.6e-06	6.0e-06	2.0e-05	3.1e-05	2.0e-06	3.3e-07	1.2e-06	4.0e-06	6.4e-06
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.36 Normalized effective doses from all pathways: Sailor operations

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	1.8e-05	2.5e-06	1.1e-05	3.4e-05	5.9e-05	3.6e-06	5.1e-07	2.2e-06	6.7e-06	1.2e-05
W-185	3.0e-07	4.2e-08	1.8e-07	5.6e-07	9.4e-07	5.8e-08	8.3e-09	3.5e-08	1.1e-07	1.9e-07
Os-185	6.3e-04	1.3e-04	4.6e-04	1.6e-03	2.5e-03	1.6e-04	2.6e-05	9.6e-05	3.1e-04	4.9e-04
Ir-192	5.3e-03	7.5e-04	3.2e-03	1.0e-02	1.7e-02	1.1e-03	1.5e-04	6.3e-04	2.0e-03	3.4e-03
Tl-204	4.8e-05	7.1e-06	2.8e-05	9.3e-05	1.4e-04	9.4e-06	1.4e-06	5.5e-06	1.8e-05	2.8e-05
Pb-210	2.3e-04	3.5e-05	1.4e-04	4.4e-04	7.1e-04	4.6e-05	6.9e-06	2.7e-05	8.7e-05	1.4e-04
Bi-207	4.1e-01	6.1e-02	2.3e-01	7.6e-01	1.2e+00	8.0e-02	1.2e-02	4.6e-02	1.5e-01	2.5e-01
Po-210	5.9e-08	1.1e-08	4.1e-08	1.3e-07	2.1e-07	1.4e-08	2.2e-09	8.1e-09	2.6e-08	4.1e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.37 Normalized effective doses from all pathways: Sailor deck duty

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	6.1e-06	7.8e-07	3.5e-06	1.2e-05	1.9e-05	1.2e-06	1.5e-07	7.0e-07	2.4e-06	3.8e-06
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	4.6e-16	5.3e-17	2.2e-16	9.5e-16	1.5e-15	9.2e-17	1.1e-17	4.4e-17	1.9e-16	3.0e-16
S-35	4.8e-09	7.4e-10	2.8e-09	9.3e-09	1.5e-08	9.5e-10	1.5e-10	5.6e-10	1.8e-09	2.9e-09
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	9.2e-09	1.3e-09	5.1e-09	1.8e-08	2.8e-08	1.8e-09	2.7e-10	1.0e-09	3.6e-09	5.4e-09
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.5e-01	1.9e-02	8.6e-02	3.0e-01	4.7e-01	3.0e-02	3.8e-03	1.7e-02	6.0e-02	9.3e-02
Fe-55	2.2e-10	3.0e-11	1.3e-10	3.9e-10	7.1e-10	4.2e-11	5.8e-12	2.5e-11	7.8e-11	1.5e-10
Fe-59	2.7e-04	3.9e-05	1.6e-04	5.0e-04	8.0e-04	5.2e-05	7.6e-06	3.1e-05	9.9e-05	1.6e-04
Co-58	6.9e-02	9.8e-03	4.1e-02	1.3e-01	2.2e-01	1.4e-02	1.9e-03	8.2e-03	2.6e-02	4.5e-02
Co-57	4.1e-02	5.7e-03	2.5e-02	7.6e-02	1.4e-01	8.2e-03	1.1e-03	4.9e-03	1.5e-02	2.8e-02
Co-58	8.9e-03	1.3e-03	5.3e-03	1.7e-02	2.8e-02	1.7e-03	2.5e-04	1.0e-03	3.3e-03	5.7e-03
Co-60	2.0e+01	2.7e+00	1.2e+01	3.6e+01	6.5e+01	3.9e+00	5.3e-01	2.3e+00	7.1e+00	1.4e+01
Ni-59	1.4e-04	1.8e-05	8.1e-05	2.5e-04	4.5e-04	2.7e-05	3.6e-06	1.6e-05	5.0e-05	9.4e-05
Ni-63	1.2e-07	1.6e-08	6.9e-08	2.1e-07	3.8e-07	2.3e-08	3.1e-09	1.4e-08	4.2e-08	8.0e-08
Zn-65	5.3e-02	5.9e-03	3.0e-02	1.1e-01	1.6e-01	1.0e-02	1.2e-03	5.9e-03	2.1e-02	3.2e-02
As-73	2.1e-06	3.1e-07	1.3e-06	4.0e-06	6.6e-06	4.2e-07	6.2e-08	2.5e-07	7.9e-07	1.3e-06
Se-75	1.2e-03	1.9e-04	7.1e-04	2.3e-03	3.6e-03	2.4e-04	3.8e-05	1.4e-04	4.6e-04	7.2e-04
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	5.8e-05	7.9e-06	3.5e-05	1.1e-04	1.9e-04	1.1e-05	1.6e-06	6.8e-06	2.1e-05	4.0e-05
Tc-97	6.8e-05	9.3e-06	4.0e-05	1.2e-04	2.2e-04	1.3e-05	1.8e-06	8.0e-06	2.5e-05	4.7e-05
Tc-97m	1.5e-06	2.2e-07	9.2e-07	2.9e-06	5.0e-06	3.0e-07	4.3e-08	1.8e-07	5.7e-07	1.0e-06
Tc-99	1.7e-04	2.3e-05	1.0e-04	3.1e-04	5.6e-04	3.4e-05	4.6e-06	2.0e-05	6.3e-05	1.2e-04
Ru-103	2.5e-05	3.7e-06	1.5e-05	4.8e-05	7.5e-05	4.9e-06	7.2e-07	2.9e-06	9.4e-06	1.5e-05
Ru-106	5.2e-01	7.1e-02	3.1e-01	9.5e-01	1.7e+00	1.0e-01	1.4e-02	6.1e-02	1.9e-01	3.6e-01
Ag-108m	1.2e+01	1.7e+00	7.2e+00	2.3e+01	4.0e+01	2.4e+00	3.3e-01	1.4e+00	4.5e+00	8.3e+00
Ag-110m	2.9e+00	4.0e-01	1.7e+00	5.4e+00	9.3e+00	5.7e-01	8.0e-02	3.4e-01	1.1e+00	1.9e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	2.5e-02	3.5e-03	1.5e-02	4.7e-02	8.2e-02	4.9e-03	7.0e-04	3.0e-03	9.2e-03	1.7e-02
Sb-124	4.9e-03	7.2e-04	2.9e-03	9.2e-03	1.5e-02	9.7e-04	1.4e-04	5.8e-04	1.8e-03	3.0e-03
Sb-125	1.8e+00	2.5e-01	1.1e+00	3.4e+00	5.9e+00	3.6e-01	5.0e-02	2.1e-01	6.7e-01	1.2e+00
Te-123m	2.7e-04	4.3e-05	1.6e-04	5.2e-04	8.2e-04	5.3e-05	8.4e-06	3.1e-05	1.0e-04	1.6e-04
Te-127m	1.6e-05	2.5e-06	9.1e-06	3.0e-05	4.8e-05	3.1e-06	4.9e-07	1.8e-06	6.0e-06	9.6e-06
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.37 Normalized effective doses from all pathways: Sailor deck duty

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	2.1e-04	2.9e-05	1.2e-04	3.9e-04	6.8e-04	4.1e-05	5.8e-06	2.5e-05	7.7e-05	1.4e-04
W-185	7.4e-07	1.1e-07	4.4e-07	1.4e-06	2.4e-06	1.5e-07	2.1e-08	8.8e-08	2.7e-07	4.8e-07
Os-185	1.1e-03	1.8e-04	6.8e-04	2.1e-03	3.4e-03	2.3e-04	3.6e-05	1.3e-04	4.2e-04	6.8e-04
Ir-192	7.9e-03	1.1e-03	4.7e-03	1.5e-02	2.5e-02	1.6e-03	2.2e-04	9.4e-04	2.9e-03	5.1e-03
Tl-204	1.1e-04	1.6e-05	6.2e-05	2.1e-04	3.2e-04	2.1e-05	3.1e-06	1.2e-05	4.0e-05	6.3e-05
Pb-210	4.2e-04	6.2e-05	2.5e-04	7.9e-04	1.3e-03	8.2e-05	1.2e-05	4.9e-05	1.6e-04	2.5e-04
Bi-207	5.4e-01	8.1e-02	3.1e-01	1.0e+00	1.7e+00	1.1e-01	1.6e-02	6.1e-02	2.0e-01	3.3e-01
Po-210	9.3e-08	1.4e-08	5.5e-08	1.8e-07	2.8e-07	1.8e-08	2.9e-09	1.1e-08	3.5e-08	5.5e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.38 Normalized effective doses from all pathways: Scrap truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.2e-07	7.5e-08	1.2e-07	1.6e-07	1.8e-07	2.4e-08	1.5e-08	2.3e-08	3.2e-08	3.4e-08
Na-22	2.0e+00	1.2e+00	2.0e+00	2.7e+00	2.9e+00	4.0e-01	2.6e-01	3.9e-01	5.3e-01	5.7e-01
P-32	3.0e-03	1.8e-03	2.9e-03	4.1e-03	4.4e-03	6.0e-04	3.8e-04	5.8e-04	8.0e-04	8.6e-04
S-35	1.4e-07	8.5e-08	1.3e-07	1.9e-07	2.0e-07	2.7e-08	1.7e-08	2.7e-08	3.6e-08	3.9e-08
Cl-36	4.0e-04	2.5e-04	3.9e-04	5.4e-04	5.8e-04	7.8e-05	5.1e-05	7.7e-05	1.0e-04	1.1e-04
K-40	1.6e-01	1.0e-01	1.6e-01	2.2e-01	2.4e-01	3.2e-02	2.1e-02	3.1e-02	4.2e-02	4.6e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.6e-06	1.6e-06	2.5e-06	3.5e-06	3.8e-06	5.1e-07	3.3e-07	5.0e-07	6.9e-07	7.4e-07
Sc-46	1.9e+00	1.2e+00	1.8e+00	2.6e+00	2.8e+00	3.7e-01	2.4e-01	3.7e-01	5.0e-01	5.4e-01
Cr-51	1.9e-02	1.2e-02	1.8e-02	2.6e-02	2.8e-02	3.7e-03	2.4e-03	3.6e-03	4.9e-03	5.3e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	7.8e-01	4.8e-01	7.6e-01	1.1e+00	1.1e+00	1.5e-01	9.9e-02	1.5e-01	2.1e-01	2.2e-01
Fe-55	1.6e-11	1.0e-11	1.6e-11	2.2e-11	2.4e-11	3.2e-12	2.1e-12	3.1e-12	4.3e-12	4.6e-12
Fe-59	1.1e+00	6.8e-01	1.1e+00	1.5e+00	1.6e+00	2.2e-01	1.4e-01	2.1e-01	2.9e-01	3.1e-01
Co-56	3.4e+00	2.1e+00	3.3e+00	4.6e+00	5.0e+00	6.7e-01	4.3e-01	6.6e-01	8.9e-01	9.6e-01
Co-57	1.2e-02	7.5e-03	1.2e-02	1.6e-02	1.8e-02	2.4e-03	1.5e-03	2.3e-03	3.2e-03	3.4e-03
Co-58	8.6e-01	5.3e-01	8.4e-01	1.2e+00	1.3e+00	1.7e-01	1.1e-01	1.7e-01	2.3e-01	2.4e-01
Co-60	2.5e+00	1.5e+00	2.5e+00	3.4e+00	3.7e+00	5.0e-01	3.2e-01	4.8e-01	6.6e-01	7.1e-01
Ni-59	1.3e-05	8.0e-06	1.3e-05	1.8e-05	1.9e-05	2.6e-06	1.6e-06	2.5e-06	3.4e-06	3.7e-06
Ni-63	2.3e-12	1.4e-12	2.2e-12	3.1e-12	3.4e-12	4.5e-13	2.9e-13	4.4e-13	6.0e-13	6.5e-13
Zn-65	5.6e-01	3.5e-01	5.5e-01	7.7e-01	8.3e-01	1.1e-01	7.2e-02	1.1e-01	1.5e-01	1.6e-01
As-73	4.0e-07	2.5e-07	3.9e-07	5.5e-07	5.9e-07	8.0e-08	5.1e-08	7.8e-08	1.1e-07	1.1e-07
Se-75	1.7e-01	1.1e-01	1.7e-01	2.3e-01	2.5e-01	3.4e-02	2.2e-02	3.3e-02	4.5e-02	4.8e-02
Sr-85	3.8e-01	2.4e-01	3.7e-01	5.2e-01	5.6e-01	7.5e-02	4.8e-02	7.4e-02	1.0e-01	1.1e-01
Sr-89	2.7e-03	1.7e-03	2.7e-03	3.7e-03	4.0e-03	5.4e-04	3.5e-04	5.3e-04	7.2e-04	7.8e-04
Sr-90	8.1e-03	5.0e-03	7.9e-03	1.1e-02	1.2e-02	1.6e-03	1.0e-03	1.6e-03	2.1e-03	2.3e-03
Y-91	8.4e-03	4.0e-03	8.3e-03	8.7e-03	9.4e-03	1.3e-03	8.1e-04	1.2e-03	1.7e-03	1.8e-03
Zr-93	8.3e-12	5.1e-12	8.1e-12	1.1e-11	1.2e-11	1.6e-12	1.1e-12	1.6e-12	2.2e-12	2.4e-12
Zr-95	7.0e-01	4.3e-01	6.8e-01	9.5e-01	1.0e+00	1.4e-01	8.9e-02	1.3e-01	1.8e-01	2.0e-01
Nb-93m	2.1e-16	1.3e-16	2.0e-16	2.8e-16	3.1e-16	4.1e-17	2.6e-17	4.0e-17	5.5e-17	5.9e-17
Nb-94	1.5e+00	9.0e-01	1.4e+00	2.0e+00	2.1e+00	2.9e-01	1.8e-01	2.8e-01	3.8e-01	4.1e-01
Nb-95	6.6e-01	4.0e-01	6.4e-01	8.9e-01	9.6e-01	1.3e-01	8.3e-02	1.3e-01	1.7e-01	1.9e-01
Mo-93	8.7e-20	4.0e-20	8.2e-20	1.3e-19	1.5e-19	1.7e-20	8.0e-21	1.6e-20	2.6e-20	2.9e-20
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	8.7e-06	4.1e-06	8.5e-06	9.1e-06	9.8e-06	1.3e-06	8.5e-07	1.3e-06	1.8e-06	1.9e-06
Tc-99	8.9e-06	4.3e-06	8.8e-06	9.4e-06	1.0e-05	1.4e-06	8.8e-07	1.3e-06	1.8e-06	2.0e-06
Ru-103	3.7e-01	2.3e-01	3.6e-01	5.1e-01	5.5e-01	7.3e-02	4.7e-02	7.2e-02	9.8e-02	1.1e-01
Ru-106	2.0e-01	1.2e-01	1.9e-01	2.7e-01	2.9e-01	3.9e-02	2.5e-02	3.8e-02	5.2e-02	5.6e-02
Ag-108m	1.4e+00	8.6e-01	1.4e+00	1.9e+00	2.0e+00	2.7e-01	1.8e-01	2.7e-01	3.7e-01	3.9e-01
Ag-110m	2.6e+00	1.6e+00	2.5e+00	3.5e+00	3.7e+00	5.0e-01	3.2e-01	4.9e-01	6.7e-01	7.2e-01
Cd-109	3.5e-05	2.2e-05	3.4e-05	4.7e-05	5.1e-05	6.9e-06	4.4e-06	6.8e-06	9.2e-06	9.9e-06
Sn-113	1.8e-01	1.1e-01	1.8e-01	2.5e-01	2.7e-01	3.6e-02	2.3e-02	3.5e-02	4.8e-02	5.2e-02
Sb-124	1.7e+00	1.1e+00	1.7e+00	2.3e+00	2.5e+00	3.4e-01	2.2e-01	3.3e-01	4.5e-01	4.8e-01
Sb-125	3.4e-01	2.1e-01	3.3e-01	4.6e-01	5.0e-01	6.7e-02	4.3e-02	6.6e-02	8.9e-02	9.6e-02
Te-123m	2.9e-02	1.8e-02	2.8e-02	3.9e-02	4.2e-02	5.7e-03	3.6e-03	5.5e-03	7.6e-03	8.1e-03
Te-127m	3.6e-03	2.2e-03	3.5e-03	4.9e-03	5.3e-03	7.2e-04	4.6e-04	7.0e-04	9.5e-04	1.0e-03
I-125	2.3e-10	1.4e-10	2.3e-10	3.2e-10	3.4e-10	4.6e-11	2.9e-11	4.5e-11	6.1e-11	6.6e-11
I-129	7.0e-08	4.3e-08	6.9e-08	9.6e-08	1.0e-07	1.4e-08	8.9e-09	1.4e-08	1.8e-08	2.0e-08
I-131	2.0e-01	1.2e-01	1.9e-01	2.7e-01	3.0e-01	3.9e-02	2.4e-02	3.8e-02	5.3e-02	5.8e-02
Cs-134	1.4e+00	8.6e-01	1.4e+00	1.9e+00	2.0e+00	2.8e-01	1.8e-01	2.7e-01	3.7e-01	4.0e-01
Cs-135	4.4e-06	2.7e-06	4.2e-06	5.9e-06	6.4e-06	8.6e-07	5.5e-07	8.4e-07	1.1e-06	1.2e-06
Cs-137	5.0e-01	3.1e-01	4.9e-01	6.8e-01	7.3e-01	9.9e-02	6.4e-02	9.7e-02	1.3e-01	1.4e-01
Ba-133	2.3e-01	1.4e-01	2.2e-01	3.1e-01	3.3e-01	4.5e-02	2.9e-02	4.4e-02	6.0e-02	6.4e-02
Ce-139	3.1e-02	1.9e-02	3.1e-02	4.3e-02	4.6e-02	6.2e-03	4.0e-03	6.0e-03	8.2e-03	8.9e-03
Ce-141	1.1e-02	6.8e-03	1.1e-02	1.5e-02	1.6e-02	2.2e-03	1.4e-03	2.1e-03	2.9e-03	3.1e-03
Ce-144	4.4e-02	2.7e-02	4.3e-02	6.0e-02	6.5e-02	8.7e-03	5.6e-03	8.5e-03	1.2e-02	1.3e-02
Pm-147	1.2e-06	7.3e-07	1.2e-06	1.6e-06	1.7e-06	2.3e-07	1.5e-07	2.3e-07	3.1e-07	3.4e-07

Table F2.38 Normalized effective doses from all pathways: Scrap truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.5e-11	9.0e-12	1.4e-11	2.0e-11	2.1e-11	2.9e-12	1.9e-12	2.8e-12	3.9e-12	4.2e-12
Eu-152	1.0e+00	6.5e-01	1.0e+00	1.4e+00	1.5e+00	2.1e-01	1.3e-01	2.0e-01	2.8e-01	3.0e-01
Eu-154	1.0e+00	6.4e-01	1.0e+00	1.4e+00	1.5e+00	2.0e-01	1.3e-01	2.0e-01	2.7e-01	2.9e-01
Eu-155	1.2e-03	7.3e-04	1.1e-03	1.6e-03	1.7e-03	2.3e-04	1.5e-04	2.3e-04	3.1e-04	3.3e-04
Gd-153	1.5e-03	9.4e-04	1.5e-03	2.1e-03	2.2e-03	3.0e-04	1.9e-04	2.9e-04	4.0e-04	4.3e-04
Tb-160	1.0e+00	6.2e-01	9.7e-01	1.4e+00	1.5e+00	2.0e-01	1.3e-01	1.9e-01	2.6e-01	2.8e-01
Tm-170	5.4e-04	3.3e-04	5.3e-04	7.3e-04	7.9e-04	1.1e-04	6.9e-05	1.0e-04	1.4e-04	1.5e-04
Tm-171	1.3e-07	8.2e-08	1.3e-07	1.8e-07	1.9e-07	2.6e-08	1.7e-08	2.6e-08	3.5e-08	3.8e-08
Ta-182	1.1e+00	7.1e-01	1.1e+00	1.6e+00	1.7e+00	2.3e-01	1.5e-01	2.2e-01	3.0e-01	3.3e-01
W-181	1.9e-05	1.2e-05	1.9e-05	2.6e-05	2.8e-05	3.8e-06	2.4e-06	3.7e-06	5.0e-06	5.4e-06
W-185	2.7e-05	1.7e-05	2.7e-05	3.7e-05	4.0e-05	5.4e-06	3.5e-06	5.3e-06	7.2e-06	7.7e-06
Os-185	5.6e-01	3.5e-01	5.5e-01	7.6e-01	8.2e-01	1.1e-01	7.1e-02	1.1e-01	1.5e-01	1.6e-01
Ir-192	5.5e-01	3.4e-01	5.4e-01	7.5e-01	8.1e-01	1.1e-01	7.0e-02	1.1e-01	1.5e-01	1.6e-01
Tl-204	2.6e-04	1.6e-04	2.5e-04	3.5e-04	3.8e-04	5.1e-05	3.3e-05	5.0e-05	6.8e-05	7.3e-05
Pb-210	8.4e-04	5.2e-04	8.2e-04	1.1e-03	1.2e-03	1.7e-04	1.1e-04	1.6e-04	2.2e-04	2.4e-04
Bi-207	1.4e+00	8.5e-01	1.3e+00	1.9e+00	2.0e+00	2.7e-01	1.8e-01	2.7e-01	3.6e-01	3.9e-01
Po-210	8.9e-06	5.5e-06	8.7e-06	1.2e-05	1.3e-05	1.8e-06	1.1e-06	1.7e-06	2.3e-06	2.5e-06
Ra-226	1.6e+00	1.0e+00	1.6e+00	2.2e+00	2.4e+00	3.2e-01	2.1e-01	3.1e-01	4.2e-01	4.6e-01
Ra-228	8.0e-01	4.9e-01	7.8e-01	1.1e+00	1.2e+00	1.6e-01	1.0e-01	1.5e-01	2.1e-01	2.3e-01
Ac-227	2.3e-01	1.4e-01	2.2e-01	3.1e-01	3.3e-01	4.5e-02	2.9e-02	4.4e-02	6.0e-02	6.5e-02
Th-228	1.3e+00	8.3e-01	1.3e+00	1.8e+00	2.0e+00	2.6e-01	1.7e-01	2.6e-01	3.5e-01	3.8e-01
Th-229	1.6e-01	1.0e-01	1.6e-01	2.2e-01	2.4e-01	3.2e-02	2.1e-02	3.2e-02	4.3e-02	4.6e-02
Th-230	4.0e-05	2.5e-05	3.9e-05	5.5e-05	6.0e-05	7.9e-06	5.1e-06	7.8e-06	1.1e-05	1.2e-05
Th-232	1.1e-03	4.9e-04	1.0e-03	1.6e-03	1.8e-03	2.1e-04	9.9e-05	2.0e-04	3.2e-04	3.5e-04
Pa-231	1.9e-02	1.2e-02	1.8e-02	2.5e-02	2.7e-02	3.7e-03	2.4e-03	3.6e-03	4.9e-03	5.3e-03
U-232	5.4e-03	2.5e-03	5.1e-03	8.2e-03	9.3e-03	1.1e-03	5.0e-04	1.0e-03	1.6e-03	1.8e-03
U-233	6.5e-05	4.0e-05	6.3e-05	8.8e-05	9.5e-05	1.3e-05	8.2e-06	1.2e-05	1.7e-05	1.8e-05
U-234	4.5e-06	2.8e-06	4.4e-06	6.1e-06	6.6e-06	8.8e-07	5.7e-07	8.7e-07	1.2e-06	1.3e-06
U-235	4.4e-02	2.7e-02	4.3e-02	6.0e-02	6.5e-02	8.7e-03	5.6e-03	8.6e-03	1.2e-02	1.3e-02
U-236	1.4e-06	8.5e-07	1.3e-06	1.9e-06	2.0e-06	2.7e-07	1.7e-07	2.6e-07	3.6e-07	3.9e-07
U-238	2.3e-02	1.4e-02	2.3e-02	3.1e-02	3.4e-02	4.6e-03	2.9e-03	4.5e-03	6.1e-03	6.6e-03
Np-237	1.1e-01	7.1e-02	1.1e-01	1.6e-01	1.7e-01	2.3e-02	1.5e-02	2.2e-02	3.0e-02	3.2e-02
Pu-236	3.8e-06	2.3e-06	3.7e-06	5.2e-06	5.6e-06	7.5e-07	4.8e-07	7.3e-07	1.0e-06	1.1e-06
Pu-238	7.7e-07	4.7e-07	7.5e-07	1.0e-06	1.1e-06	1.5e-07	9.7e-08	1.5e-07	2.0e-07	2.2e-07
Pu-239	2.0e-05	1.2e-05	2.0e-05	2.7e-05	2.9e-05	4.0e-06	2.6e-06	3.9e-06	5.3e-06	5.7e-06
Pu-240	5.6e-07	3.4e-07	5.4e-07	7.6e-07	8.1e-07	1.1e-07	7.1e-08	1.1e-07	1.5e-07	1.6e-07
Pu-241	9.3e-08	5.7e-08	9.0e-08	1.3e-07	1.4e-07	1.8e-08	1.2e-08	1.8e-08	2.4e-08	2.6e-08
Pu-242	4.6e-07	2.8e-07	4.5e-07	6.2e-07	6.7e-07	9.0e-08	5.8e-08	8.8e-08	1.2e-07	1.3e-07
Pu-244	2.9e-01	1.8e-01	2.8e-01	3.9e-01	4.2e-01	5.6e-02	3.6e-02	5.5e-02	7.5e-02	8.1e-02
Am-241	1.5e-05	9.1e-06	1.4e-05	2.0e-05	2.2e-05	2.9e-06	1.9e-06	2.9e-06	3.9e-06	4.2e-06
Am-242m	3.5e-03	2.2e-03	3.4e-03	4.8e-03	5.2e-03	6.9e-04	4.5e-04	6.8e-04	9.2e-04	1.0e-03
Am-243	5.1e-02	3.1e-02	4.9e-02	6.9e-02	7.4e-02	1.0e-02	6.4e-03	9.8e-03	1.3e-02	1.4e-02
Cm-242	2.0e-06	1.3e-06	2.0e-06	2.8e-06	3.0e-06	4.0e-07	2.6e-07	3.9e-07	5.4e-07	5.8e-07
Cm-243	3.9e-02	2.4e-02	3.8e-02	5.3e-02	5.7e-02	7.7e-03	5.0e-03	7.6e-03	1.0e-02	1.1e-02
Cm-244	1.8e-06	1.1e-06	1.8e-06	2.5e-06	2.7e-06	3.6e-07	2.3e-07	3.5e-07	4.8e-07	5.2e-07
Cm-245	8.5e-03	5.3e-03	8.3e-03	1.2e-02	1.2e-02	1.7e-03	1.1e-03	1.6e-03	2.2e-03	2.4e-03
Cm-246	7.5e-11	4.6e-11	7.3e-11	1.0e-10	1.1e-10	1.5e-11	9.6e-12	1.5e-11	2.0e-11	2.1e-11
Cm-247	2.3e-01	1.4e-01	2.3e-01	3.1e-01	3.4e-01	4.6e-02	2.9e-02	4.5e-02	6.1e-02	6.6e-02
Cm-248	6.1e-11	3.7e-11	5.9e-11	8.2e-11	8.9e-11	1.2e-11	7.7e-12	1.2e-11	1.6e-11	1.7e-11
Bk-249	5.3e-06	2.5e-06	5.0e-06	8.0e-06	9.0e-06	1.0e-06	5.1e-07	9.9e-07	1.6e-06	1.7e-06
Cf-248	5.4e-07	3.3e-07	5.2e-07	7.3e-07	7.9e-07	1.1e-07	6.8e-08	1.0e-07	1.4e-07	1.5e-07
Cf-249	2.3e-01	1.4e-01	2.2e-01	3.1e-01	3.3e-01	4.5e-02	2.9e-02	4.4e-02	6.0e-02	6.5e-02
Cf-250	2.5e-11	1.5e-11	2.4e-11	3.4e-11	3.6e-11	4.9e-12	3.2e-12	4.8e-12	6.5e-12	7.0e-12
Cf-251	2.3e-02	1.4e-02	2.3e-02	3.2e-02	3.4e-02	4.6e-03	2.9e-03	4.5e-03	6.1e-03	6.6e-03
Cf-252	1.1e-06	6.7e-07	1.1e-06	1.5e-06	1.6e-06	2.1e-07	1.4e-07	2.1e-07	2.9e-07	3.1e-07
Cf-254	1.6e+01	9.9e+00	1.6e+01	2.2e+01	2.3e+01	3.2e+00	2.0e+00	3.1e+00	4.2e+00	4.5e+00
Es-254	8.6e-01	5.3e-01	8.4e-01	1.2e+00	1.3e+00	1.7e-01	1.1e-01	1.7e-01	2.3e-01	2.4e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.39 Normalized effective doses from all pathways: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	9.9e-01	1.6e-01	6.9e-01	2.2e+00	2.9e+00	2.0e-01	3.1e-02	1.4e-01	4.2e-01	5.6e-01
P-32	9.1e-04	9.3e-05	4.9e-04	2.3e-03	3.3e-03	1.8e-04	1.9e-05	9.6e-05	4.5e-04	6.5e-04
S-35	2.9e-04	2.9e-05	1.7e-04	7.1e-04	9.6e-04	5.8e-05	5.7e-06	3.3e-05	1.4e-04	1.9e-04
Cl-36	6.8e-04	5.4e-05	3.7e-04	1.7e-03	2.4e-03	1.3e-04	1.1e-05	7.3e-05	3.4e-04	4.6e-04
K-40	7.8e-02	1.2e-02	5.4e-02	1.7e-01	2.3e-01	1.5e-02	2.4e-03	1.1e-02	3.4e-02	4.5e-02
Ca-41	2.2e-04	1.9e-05	1.3e-04	5.8e-04	7.7e-04	4.3e-05	3.7e-06	2.5e-05	1.1e-04	1.5e-04
Ca-45	1.0e-03	1.0e-04	5.8e-04	2.5e-03	3.3e-03	2.0e-04	2.0e-05	1.1e-04	4.9e-04	6.4e-04
Sc-46	1.8e+00	2.4e-01	1.1e+00	4.4e+00	5.2e+00	3.5e-01	4.7e-02	2.1e-01	8.7e-01	1.0e+00
Cr-51	2.8e-03	0.0e+00	1.5e-03	6.9e-03	1.0e-02	5.4e-04	0.0e+00	2.9e-04	1.4e-03	2.0e-03
Mn-53	1.4e-05	6.6e-07	7.8e-06	3.5e-05	5.3e-05	2.8e-06	1.3e-07	1.6e-06	6.8e-06	1.0e-05
Mn-54	4.6e-01	3.0e-02	3.0e-01	1.1e+00	1.6e+00	9.1e-02	6.0e-03	5.8e-02	2.2e-01	3.2e-01
Fe-55	4.2e-06	0.0e+00	2.1e-06	1.0e-05	1.6e-05	8.3e-07	0.0e+00	4.2e-07	2.0e-06	3.2e-06
Fe-59	1.2e-02	0.0e+00	7.2e-03	3.0e-02	4.5e-02	2.4e-03	0.0e+00	1.4e-03	6.0e-03	8.9e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.8e-01	5.2e-02	2.3e-01	9.4e-01	1.1e+00	7.5e-02	1.0e-02	4.6e-02	1.9e-01	2.2e-01
Sr-89	3.1e-03	4.2e-04	1.9e-03	7.5e-03	9.1e-03	6.0e-04	8.3e-05	3.6e-04	1.5e-03	1.8e-03
Sr-90	3.4e-02	3.8e-03	2.1e-02	8.6e-02	1.1e-01	6.8e-03	7.7e-04	4.1e-03	1.7e-02	2.2e-02
Y-91	7.1e-03	9.8e-04	4.3e-03	1.7e-02	2.1e-02	1.4e-03	2.0e-04	8.5e-04	3.4e-03	4.0e-03
Zr-93	2.3e-03	2.1e-04	1.3e-03	5.5e-03	7.6e-03	4.5e-04	4.2e-05	2.5e-04	1.1e-03	1.5e-03
Zr-95	9.4e-01	1.2e-01	5.7e-01	2.3e+00	2.7e+00	1.8e-01	2.4e-02	1.1e-01	4.6e-01	5.4e-01
Nb-93m	3.4e-04	3.3e-05	1.9e-04	8.3e-04	1.1e-03	6.7e-05	6.5e-06	3.8e-05	1.6e-04	2.2e-04
Nb-94	1.8e+00	2.3e-01	1.1e+00	4.6e+00	5.4e+00	3.6e-01	4.6e-02	2.2e-01	9.0e-01	1.0e+00
Nb-95	4.6e-01	6.4e-02	2.8e-01	1.1e+00	1.4e+00	9.1e-02	1.3e-02	5.5e-02	2.2e-01	2.7e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.5e-02	0.0e+00	1.3e-02	6.1e-02	9.3e-02	4.9e-03	0.0e+00	2.7e-03	1.2e-02	1.8e-02
Sb-125	7.7e-03	0.0e+00	4.2e-03	1.9e-02	2.9e-02	1.5e-03	0.0e+00	8.4e-04	3.8e-03	5.8e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.8e-03	1.0e-04	8.9e-04	4.6e-03	6.7e-03	3.5e-04	2.0e-05	1.8e-04	9.0e-04	1.3e-03
I-129	1.9e-02	1.0e-03	9.6e-03	4.9e-02	7.2e-02	3.8e-03	2.0e-04	1.9e-03	9.7e-03	1.4e-02
I-131	9.1e-03	3.1e-04	3.1e-03	2.3e-02	3.9e-02	1.8e-03	6.0e-05	6.3e-04	4.5e-03	7.7e-03
Cs-134	2.2e-01	4.2e-03	2.7e-02	8.9e-01	1.3e+00	4.4e-02	8.4e-04	5.4e-03	1.8e-01	2.6e-01
Cs-135	1.8e-04	2.2e-06	2.1e-05	8.2e-04	1.1e-03	3.5e-05	4.3e-07	4.2e-06	1.2e-04	2.1e-04
Cs-137	8.4e-02	1.6e-03	1.0e-02	3.3e-01	4.9e-01	1.7e-02	3.1e-04	2.0e-03	6.6e-02	9.7e-02
Ba-133	3.6e-01	4.5e-02	2.2e-01	8.9e-01	1.0e+00	7.0e-02	8.9e-03	4.3e-02	1.8e-01	2.0e-01
Ce-139	7.9e-02	1.0e-02	4.9e-02	2.0e-01	2.3e-01	1.6e-02	2.0e-03	9.5e-03	3.9e-02	4.5e-02
Ce-141	2.2e-02	3.1e-03	1.3e-02	5.4e-02	8.8e-02	4.4e-03	6.1e-04	2.7e-03	1.1e-02	1.3e-02
Ce-144	5.9e-02	7.6e-03	3.6e-02	1.5e-01	1.7e-01	1.2e-02	1.5e-03	7.1e-03	2.9e-02	3.3e-02
Pm-147	1.1e-03	1.1e-04	6.4e-04	2.8e-03	3.8e-03	2.3e-04	2.2e-05	1.3e-04	5.5e-04	7.4e-04

Table F2.39 Normalized effective doses from all pathways: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.9e-04	8.0e-05	4.9e-04	2.2e-03	3.0e-03	1.7e-04	1.6e-05	9.7e-05	4.2e-04	5.8e-04
Eu-152	1.3e+00	1.7e-01	8.0e-01	3.8e+00	3.8e+00	2.5e-01	3.3e-02	1.6e-01	6.4e-01	7.5e-01
Eu-154	1.3e+00	1.6e-01	7.8e-01	3.2e+00	3.7e+00	2.5e-01	3.2e-02	1.5e-01	6.3e-01	7.3e-01
Eu-155	1.7e-02	2.2e-03	1.1e-02	4.3e-02	5.1e-02	3.4e-03	4.4e-04	2.1e-03	8.5e-03	9.9e-03
Gd-153	1.8e-02	2.4e-03	1.1e-02	4.5e-02	5.3e-02	3.6e-03	4.7e-04	2.2e-03	9.0e-03	1.0e-02
Tb-160	9.3e-01	1.2e-01	5.7e-01	2.3e+00	2.7e+00	1.8e-01	2.5e-02	1.1e-01	4.5e-01	5.3e-01
Tm-170	3.0e-03	3.8e-04	1.8e-03	7.4e-03	9.2e-03	6.0e-04	7.5e-05	3.5e-04	1.5e-03	1.8e-03
Tm-171	3.8e-04	4.0e-05	2.2e-04	9.2e-04	1.2e-03	7.5e-05	8.0e-06	4.4e-05	1.8e-04	2.4e-04
Ta-182	1.2e+00	1.5e-01	7.1e-01	2.9e+00	3.4e+00	2.3e-01	3.1e-02	1.4e-01	5.7e-01	6.7e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.9e+00	3.6e-01	1.7e+00	7.1e+00	8.3e+00	5.7e-01	7.2e-02	3.5e-01	1.4e+00	1.6e+00
Ra-228	2.3e+00	2.8e-01	1.4e+00	5.7e+00	6.9e+00	4.6e-01	5.5e-02	2.8e-01	1.1e+00	1.4e+00
Ac-227	2.0e+01	1.8e+00	1.1e+01	5.0e+01	6.8e+01	4.0e+00	3.7e-01	2.2e+00	9.7e+00	1.3e+01
Th-228	1.2e+01	1.2e+00	7.0e+00	3.0e+01	4.0e+01	2.4e+00	2.5e-01	1.4e+00	5.8e+00	7.8e+00
Th-229	1.9e+01	1.7e+00	1.1e+01	4.8e+01	6.5e+01	3.8e+00	3.4e-01	2.1e+00	9.3e+00	1.3e+01
Th-230	2.4e+00	2.1e-01	1.3e+00	5.8e+00	7.9e+00	4.6e-01	4.1e-02	2.6e-01	1.1e+00	1.5e+00
Th-232	3.9e+00	3.4e-01	2.2e+00	9.6e+00	1.3e+01	7.7e-01	6.9e-02	4.3e-01	1.9e+00	2.6e+00
Pa-231	5.9e+00	5.4e-01	3.3e+00	1.5e+01	2.0e+01	1.2e+00	1.1e-01	6.5e-01	2.8e+00	3.9e+00
U-232	8.8e+00	7.6e-01	4.8e+00	2.2e+01	3.0e+01	1.7e+00	1.5e-01	9.5e-01	4.2e+00	5.8e+00
U-233	2.2e+00	1.9e-01	1.2e+00	5.5e+00	7.5e+00	4.4e-01	3.8e-02	2.4e-01	1.1e+00	1.5e+00
U-234	2.2e+00	1.9e-01	1.2e+00	5.4e+00	7.4e+00	4.3e-01	3.8e-02	2.4e-01	1.0e+00	1.4e+00
U-235	2.1e+00	1.9e-01	1.2e+00	5.1e+00	6.9e+00	4.1e-01	3.9e-02	2.3e-01	9.9e-01	1.4e+00
U-236	2.0e+00	1.7e-01	1.1e+00	5.0e+00	6.8e+00	4.0e-01	3.5e-02	2.2e-01	9.7e-01	1.3e+00
U-238	1.9e+00	1.6e-01	1.0e+00	4.6e+00	6.3e+00	3.7e-01	3.3e-02	2.0e-01	8.9e-01	1.2e+00
Np-237	5.1e+00	4.6e-01	2.8e+00	1.2e+01	1.7e+01	1.0e+00	9.3e-02	5.6e-01	2.4e+00	3.3e+00
Pu-236	2.4e+00	2.1e-01	1.3e+00	5.8e+00	8.0e+00	4.7e-01	4.2e-02	2.6e-01	1.1e+00	1.6e+00
Pu-238	3.7e+00	3.2e-01	2.0e+00	8.9e+00	1.2e+01	7.2e-01	6.5e-02	4.0e-01	1.7e+00	2.4e+00
Pu-239	2.8e+00	2.5e-01	1.6e+00	6.8e+00	9.3e+00	5.5e-01	5.1e-02	3.1e-01	1.3e+00	1.8e+00
Pu-240	2.8e+00	2.5e-01	1.6e+00	6.8e+00	9.3e+00	5.5e-01	5.1e-02	3.1e-01	1.3e+00	1.8e+00
Pu-241	3.1e-02	2.8e-03	1.7e-02	7.5e-02	1.0e-01	6.1e-03	5.6e-04	3.4e-03	1.5e-02	2.0e-02
Pu-242	2.6e+00	2.3e-01	1.4e+00	6.3e+00	8.7e+00	5.1e-01	4.7e-02	2.8e-01	1.2e+00	1.7e+00
Pu-244	2.9e+00	2.9e-01	1.6e+00	6.9e+00	9.2e+00	5.7e-01	5.8e-02	3.3e-01	1.4e+00	1.8e+00
Am-241	8.8e+00	7.6e-01	4.8e+00	2.1e+01	3.0e+01	1.7e+00	1.5e-01	9.5e-01	4.2e+00	5.8e+00
Am-242m	8.8e+00	7.6e-01	4.8e+00	2.2e+01	3.0e+01	1.7e+00	1.5e-01	9.6e-01	4.2e+00	5.8e+00
Am-243	8.9e+00	7.9e-01	4.9e+00	2.2e+01	3.0e+01	1.8e+00	1.6e-01	9.7e-01	4.3e+00	5.8e+00
Cm-242	1.0e+00	9.2e-02	5.7e-01	2.5e+00	3.4e+00	2.0e-01	1.8e-02	1.1e-01	4.9e-01	6.6e-01
Cm-243	6.6e+00	5.8e-01	3.6e+00	1.6e+01	2.2e+01	1.3e+00	1.2e-01	7.1e-01	3.2e+00	4.3e+00
Cm-244	5.5e+00	4.8e-01	3.0e+00	1.3e+01	1.9e+01	1.1e+00	9.6e-02	6.0e-01	2.6e+00	3.6e+00
Cm-245	8.8e+00	7.7e-01	4.8e+00	2.2e+01	3.0e+01	1.7e+00	1.5e-01	9.6e-01	4.2e+00	5.8e+00
Cm-246	8.8e+00	7.6e-01	4.8e+00	2.1e+01	3.0e+01	1.7e+00	1.5e-01	9.5e-01	4.2e+00	5.8e+00
Cm-247	8.5e+00	7.8e-01	4.7e+00	2.1e+01	2.8e+01	1.7e+00	1.6e-01	9.3e-01	4.0e+00	5.5e+00
Cm-248	3.1e+01	2.7e+00	1.7e+01	7.6e+01	1.0e+02	6.1e+00	5.4e-01	3.4e+00	1.5e+01	2.0e+01
Bk-249	3.3e-02	2.9e-03	1.8e-02	8.1e-02	1.1e-01	6.5e-03	5.7e-04	3.6e-03	1.6e-02	2.2e-02
Cf-248	1.9e+00	1.6e-01	1.0e+00	4.5e+00	6.2e+00	3.6e-01	3.2e-02	2.0e-01	8.9e-01	1.2e+00
Cf-249	1.5e+01	1.3e+00	8.3e+00	3.7e+01	5.0e+01	2.9e+00	2.7e-01	1.6e+00	7.2e+00	9.8e+00
Cf-250	7.1e+00	6.2e-01	3.9e+00	1.7e+01	2.4e+01	1.4e+00	1.2e-01	7.7e-01	3.4e+00	4.7e+00
Cf-251	1.5e+01	1.3e+00	8.3e+00	3.7e+01	5.0e+01	3.0e+00	2.6e-01	1.6e+00	7.2e+00	9.9e+00
Cf-252	4.1e+00	3.6e-01	2.3e+00	1.0e+01	1.4e+01	8.1e-01	7.2e-02	4.5e-01	2.0e+00	2.7e+00
Cf-254	1.9e+01	2.5e+00	1.1e+01	4.6e+01	6.5e+01	3.7e+00	5.1e-01	2.3e+00	9.0e+00	1.1e+01
Es-254	2.8e+00	3.2e-01	1.6e+00	6.8e+00	9.5e+00	5.5e-01	6.4e-02	3.2e-01	1.3e+00	1.7e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.40 Normalized effective doses from external exposure: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	9.9e-01	1.6e-01	6.9e-01	2.2e+00	2.9e+00	2.0e-01	3.1e-02	1.4e-01	4.2e-01	5.6e-01
P-32	6.2e-04	6.4e-05	3.3e-04	1.6e-03	2.3e-03	1.2e-04	1.3e-05	6.6e-05	3.1e-04	4.4e-04
S-35	1.1e-06	1.4e-07	6.6e-07	2.7e-06	3.2e-06	2.2e-07	2.8e-08	1.3e-07	5.4e-07	6.3e-07
Cl-36	1.5e-04	1.3e-05	8.6e-05	3.7e-04	5.0e-04	3.0e-05	2.6e-06	1.7e-05	7.5e-05	1.0e-04
K-40	7.6e-02	1.2e-02	5.3e-02	1.7e-01	2.2e-01	1.5e-02	2.3e-03	1.0e-02	3.3e-02	4.4e-02
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	9.6e-06	1.2e-06	5.9e-06	2.4e-05	2.8e-05	1.9e-06	2.5e-07	1.2e-06	4.7e-06	5.5e-06
Sc-46	1.8e+00	2.4e-01	1.1e+00	4.4e+00	5.2e+00	3.5e-01	4.7e-02	2.1e-01	8.7e-01	1.0e+00
Cr-51	2.8e-03	0.0e+00	1.5e-03	6.9e-03	1.0e-02	5.4e-04	0.0e+00	2.9e-04	1.4e-03	2.0e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.6e-01	3.0e-02	3.0e-01	1.1e+00	1.6e+00	9.1e-02	6.0e-03	5.8e-02	2.2e-01	3.2e-01
Fe-55	1.2e-12	0.0e+00	7.2e-13	3.0e-12	4.4e-12	2.4e-13	0.0e+00	1.4e-13	6.0e-13	8.7e-13
Fe-59	1.2e-02	0.0e+00	7.2e-03	3.0e-02	4.5e-02	2.4e-03	0.0e+00	1.4e-03	6.0e-03	8.9e-03
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.8e-01	5.2e-02	2.3e-01	9.4e-01	1.1e+00	7.5e-02	1.0e-02	4.6e-02	1.9e-01	2.2e-01
Sr-89	1.9e-03	2.6e-04	1.1e-03	4.8e-03	5.6e-03	3.7e-04	5.1e-05	2.2e-04	9.1e-04	1.1e-03
Sr-90	7.5e-03	9.5e-04	4.6e-03	1.9e-02	2.2e-02	1.5e-03	1.9e-04	9.1e-04	3.7e-03	4.3e-03
Y-91	4.9e-03	6.7e-04	3.0e-03	1.2e-02	1.5e-02	9.7e-04	1.3e-04	5.9e-04	2.4e-03	2.8e-03
Zr-93	3.4e-09	4.2e-10	2.0e-09	8.3e-09	9.8e-09	6.6e-10	8.3e-11	4.0e-10	1.6e-09	1.9e-09
Zr-95	9.4e-01	1.2e-01	5.7e-01	2.3e+00	2.7e+00	1.8e-01	2.3e-02	1.1e-01	4.6e-01	5.4e-01
Nb-93m	5.3e-10	6.6e-11	3.2e-10	1.3e-09	1.5e-09	1.0e-10	1.3e-11	6.3e-11	2.6e-10	3.0e-10
Nb-94	1.8e+00	2.3e-01	1.1e+00	4.5e+00	5.3e+00	3.6e-01	4.6e-02	2.2e-01	8.9e-01	1.0e+00
Nb-95	4.6e-01	6.4e-02	2.8e-01	1.1e+00	1.4e+00	9.0e-02	1.3e-02	5.5e-02	2.2e-01	2.7e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	2.5e-02	0.0e+00	1.3e-02	6.1e-02	9.3e-02	4.8e-03	0.0e+00	2.7e-03	1.2e-02	1.8e-02
Sb-125	7.7e-03	0.0e+00	4.2e-03	1.9e-02	2.9e-02	1.5e-03	0.0e+00	8.3e-04	3.8e-03	5.6e-03
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	7.2e-06	6.5e-07	4.0e-06	1.8e-05	2.5e-05	1.4e-06	1.3e-07	8.0e-07	3.6e-06	4.8e-06
I-129	1.9e-05	1.7e-06	1.1e-05	4.9e-05	6.6e-05	3.8e-06	3.3e-07	2.2e-06	9.8e-06	1.3e-05
I-131	6.7e-03	2.9e-04	3.0e-03	2.2e-02	3.8e-02	1.7e-03	5.7e-05	6.0e-04	4.4e-03	7.4e-03
Cs-134	2.2e-01	4.2e-03	2.7e-02	8.8e-01	1.3e+00	4.4e-02	8.3e-04	5.3e-03	1.7e-01	2.6e-01
Cs-135	2.0e-06	3.8e-08	2.5e-07	8.1e-06	1.2e-05	4.0e-07	7.6e-09	4.9e-08	1.6e-06	2.4e-06
Cs-137	8.3e-02	1.5e-03	1.0e-02	3.3e-01	4.9e-01	1.6e-02	3.1e-04	2.0e-03	6.5e-02	9.5e-02
Ba-133	3.6e-01	4.5e-02	2.2e-01	8.9e-01	1.0e+00	7.0e-02	8.9e-03	4.3e-02	1.7e-01	2.0e-01
Ce-139	7.9e-02	1.0e-02	4.8e-02	2.0e-01	2.3e-01	1.6e-02	2.0e-03	9.5e-03	3.8e-02	4.5e-02
Ce-141	2.2e-02	3.0e-03	1.3e-02	5.2e-02	6.6e-02	4.2e-03	5.9e-04	2.6e-03	1.0e-02	1.3e-02
Ce-144	4.8e-02	6.1e-03	2.9e-02	1.2e-01	1.4e-01	9.4e-03	1.2e-03	5.7e-03	2.3e-02	2.7e-02
Pm-147	6.7e-06	8.5e-07	4.1e-06	1.7e-05	2.0e-05	1.3e-06	1.7e-07	8.1e-07	3.3e-06	3.8e-06

Table F2.40 Normalized effective doses from external exposure: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.3e-08	1.6e-09	8.0e-09	3.2e-08	3.8e-08	2.6e-09	3.2e-10	1.6e-09	6.4e-09	7.5e-09
Eu-152	1.3e+00	1.6e-01	8.0e-01	3.2e+00	3.8e+00	2.6e-01	3.2e-02	1.6e-01	6.4e-01	7.4e-01
Eu-154	1.3e+00	1.6e-01	7.7e-01	3.1e+00	3.7e+00	2.5e-01	3.2e-02	1.5e-01	6.2e-01	7.2e-01
Eu-155	1.6e-02	2.0e-03	9.6e-03	3.9e-02	4.6e-02	3.1e-03	3.9e-04	1.9e-03	7.7e-03	9.0e-03
Gd-153	1.8e-02	2.3e-03	1.1e-02	4.4e-02	5.2e-02	3.5e-03	4.5e-04	2.1e-03	8.7e-03	1.0e-02
Tb-160	9.3e-01	1.2e-01	5.6e-01	2.3e+00	2.7e+00	1.8e-01	2.5e-02	1.1e-01	4.5e-01	5.3e-01
Tm-170	1.1e-03	1.4e-04	6.8e-04	2.7e-03	3.1e-03	2.1e-04	2.8e-05	1.3e-04	5.2e-04	6.1e-04
Tm-171	4.0e-05	5.2e-06	2.5e-05	1.0e-04	1.2e-04	8.0e-06	1.0e-06	4.9e-06	2.0e-05	2.3e-05
Ta-182	1.2e+00	1.5e-01	7.1e-01	2.9e+00	3.4e+00	2.3e-01	3.0e-02	1.4e-01	5.7e-01	6.7e-01
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	2.0e+00	2.5e-01	1.2e+00	5.0e+00	5.8e+00	3.9e-01	5.0e-02	2.4e-01	9.8e-01	1.1e+00
Ra-228	1.0e+00	1.3e-01	6.3e-01	2.6e+00	3.0e+00	2.0e-01	2.6e-02	1.2e-01	5.1e-01	6.0e-01
Ac-227	3.8e-01	4.8e-02	2.3e-01	9.4e-01	1.1e+00	7.4e-02	9.4e-03	4.5e-02	1.9e-01	2.2e-01
Th-228	1.6e+00	2.0e-01	9.7e-01	4.0e+00	4.6e+00	3.1e-01	4.0e-02	1.9e-01	7.8e-01	9.1e-01
Th-229	2.6e-01	3.3e-02	1.6e-01	6.4e-01	7.6e-01	5.1e-02	6.6e-03	3.1e-02	1.3e-01	1.5e-01
Th-230	2.1e-04	2.3e-05	1.3e-04	5.2e-04	6.2e-04	4.1e-05	4.6e-06	2.5e-05	1.0e-04	1.2e-04
Th-232	1.2e-02	9.9e-04	7.0e-03	3.1e-02	4.0e-02	2.4e-03	2.0e-04	1.4e-03	6.1e-03	7.9e-03
Pa-231	3.2e-02	4.1e-03	2.0e-02	8.1e-02	9.5e-02	6.4e-03	8.0e-04	3.9e-03	1.6e-02	1.9e-02
U-232	5.7e-02	4.8e-03	3.4e-02	1.5e-01	1.9e-01	1.1e-02	9.7e-04	6.7e-03	2.9e-02	3.7e-02
U-233	1.5e-04	1.8e-05	8.9e-05	3.6e-04	4.2e-04	2.9e-05	3.6e-06	1.7e-05	7.1e-05	8.3e-05
U-234	3.1e-05	3.9e-06	1.9e-05	7.6e-05	8.9e-05	6.0e-06	7.6e-07	3.7e-06	1.5e-05	1.8e-05
U-235	1.2e-01	1.5e-02	7.4e-02	3.0e-01	3.6e-01	2.4e-02	3.0e-03	1.5e-02	6.0e-02	7.0e-02
U-236	1.2e-05	1.6e-06	7.5e-06	3.1e-05	3.6e-05	2.4e-06	3.1e-07	1.5e-06	6.1e-06	7.0e-06
U-238	2.7e-02	3.5e-03	1.7e-02	6.8e-02	8.0e-02	5.4e-03	6.8e-04	3.3e-03	1.3e-02	1.6e-02
Np-237	2.0e-01	2.5e-02	1.2e-01	5.0e-01	5.9e-01	4.0e-02	5.0e-03	2.4e-02	9.8e-02	1.1e-01
Pu-236	4.2e-05	3.0e-06	2.4e-05	1.1e-04	1.5e-04	8.3e-06	6.1e-07	4.8e-06	2.2e-05	3.0e-05
Pu-238	4.3e-06	5.5e-07	2.6e-06	1.1e-05	1.3e-05	8.6e-07	1.1e-07	5.2e-07	2.1e-06	2.5e-06
Pu-239	4.0e-05	5.0e-06	2.4e-05	9.9e-05	1.2e-04	7.8e-06	9.9e-07	4.8e-06	1.9e-05	2.3e-05
Pu-240	4.1e-06	5.1e-07	2.5e-06	1.0e-05	1.2e-05	8.0e-07	1.0e-07	4.9e-07	2.0e-06	2.3e-06
Pu-241	9.1e-07	1.1e-07	5.6e-07	2.3e-06	2.7e-06	1.8e-07	2.1e-08	1.1e-07	4.5e-07	5.3e-07
Pu-242	4.0e-06	5.1e-07	2.4e-06	1.0e-05	1.2e-05	7.9e-07	1.0e-07	4.8e-07	2.0e-06	2.3e-06
Pu-244	3.7e-01	4.7e-02	2.3e-01	9.2e-01	1.1e+00	7.3e-02	9.2e-03	4.4e-02	1.8e-01	2.1e-01
Am-241	1.9e-03	2.4e-04	1.2e-03	4.8e-03	5.6e-03	3.8e-04	4.8e-05	2.3e-04	9.4e-04	1.1e-03
Am-242m	8.7e-03	1.1e-03	5.3e-03	2.2e-02	2.6e-02	1.7e-03	2.2e-04	1.0e-03	4.3e-03	5.0e-03
Am-243	1.3e-01	1.6e-02	7.8e-02	3.2e-01	3.7e-01	2.5e-02	3.2e-03	1.5e-02	6.3e-02	7.3e-02
Cm-242	3.9e-06	5.1e-07	2.4e-06	9.7e-06	1.1e-05	7.7e-07	1.0e-07	4.7e-07	1.9e-06	2.2e-06
Cm-243	8.9e-02	1.1e-02	5.4e-02	2.2e-01	2.6e-01	1.8e-02	2.2e-03	1.1e-02	4.4e-02	5.1e-02
Cm-244	3.8e-06	4.8e-07	2.3e-06	9.4e-06	1.1e-05	7.5e-07	9.5e-08	4.5e-07	1.9e-06	2.2e-06
Cm-245	4.5e-02	5.7e-03	2.7e-02	1.1e-01	1.3e-01	8.8e-03	1.1e-03	5.4e-03	2.2e-02	2.6e-02
Cm-246	2.7e-07	3.4e-08	1.6e-07	6.6e-07	7.8e-07	5.2e-08	6.6e-09	3.2e-08	1.3e-07	1.5e-07
Cm-247	3.5e-01	4.4e-02	2.1e-01	8.6e-01	1.0e+00	6.8e-02	8.6e-03	4.2e-02	1.7e-01	2.0e-01
Cm-248	2.3e-07	2.9e-08	1.4e-07	5.7e-07	6.7e-07	4.5e-08	5.7e-09	2.7e-08	1.1e-07	1.3e-07
Bk-249	6.4e-05	5.5e-06	3.8e-05	1.7e-04	2.1e-04	1.3e-05	1.1e-06	7.5e-06	3.3e-05	4.2e-05
Cf-248	6.4e-06	8.2e-07	3.9e-06	1.6e-05	1.9e-05	1.3e-06	1.6e-07	7.7e-07	3.1e-06	3.6e-06
Cf-249	3.4e-01	4.4e-02	2.1e-01	8.5e-01	1.0e+00	6.8e-02	8.5e-03	4.1e-02	1.7e-01	2.0e-01
Cf-250	1.3e-07	1.7e-08	8.0e-08	3.3e-07	3.8e-07	2.6e-08	3.3e-09	1.6e-08	6.4e-08	7.5e-08
Cf-251	7.1e-02	9.0e-03	4.3e-02	1.8e-01	2.1e-01	1.4e-02	1.8e-03	8.5e-03	3.5e-02	4.0e-02
Cf-252	6.8e-06	8.6e-07	4.1e-06	1.7e-05	2.0e-05	1.3e-06	1.7e-07	8.1e-07	3.3e-06	3.9e-06
Cf-254	1.4e+01	1.9e+00	8.4e+00	3.4e+01	4.1e+01	2.7e+00	3.7e-01	1.7e+00	6.8e+00	8.0e+00
Es-254	9.7e-01	1.2e-01	5.9e-01	2.4e+00	2.8e+00	1.9e-01	2.5e-02	1.2e-01	4.7e-01	5.5e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.41 Normalized effective doses from inhalation: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.5e-04	2.7e-05	1.5e-04	5.7e-04	8.0e-04	4.9e-05	5.2e-06	3.0e-05	1.1e-04	1.6e-04
P-32	8.0e-05	4.1e-06	2.8e-05	1.5e-04	2.3e-04	1.2e-05	8.1e-07	5.6e-06	3.0e-05	4.4e-05
S-35	2.4e-04	2.1e-05	1.3e-04	5.9e-04	8.0e-04	4.7e-05	4.2e-06	2.6e-05	1.2e-04	1.6e-04
Cl-36	4.1e-04	2.4e-05	2.0e-04	1.0e-03	1.5e-03	8.0e-05	4.8e-06	4.0e-05	2.0e-04	2.9e-04
K-40	3.9e-04	4.1e-05	2.3e-04	8.9e-04	1.2e-03	7.7e-05	8.1e-06	4.7e-05	1.8e-04	2.5e-04
Ca-41	8.1e-05	5.2e-06	3.3e-05	1.5e-04	2.1e-04	1.2e-05	1.0e-06	6.6e-06	2.9e-05	4.0e-05
Ca-45	8.4e-04	5.6e-05	3.5e-04	1.6e-03	2.1e-03	1.3e-04	1.1e-05	6.9e-05	3.0e-04	4.2e-04
Sc-46	1.2e-03	1.0e-04	6.4e-04	2.8e-03	3.8e-03	2.3e-04	2.1e-05	1.2e-04	5.6e-04	7.6e-04
Cr-51	9.6e-07	0.0e+00	4.0e-07	2.4e-06	3.9e-06	1.9e-07	0.0e+00	8.0e-08	4.7e-07	7.7e-07
Mn-53	5.9e-06	2.6e-07	2.9e-06	1.4e-05	2.2e-05	1.2e-06	5.2e-08	5.8e-07	2.8e-06	4.2e-06
Mn-54	1.8e-04	8.1e-06	9.1e-05	4.4e-04	6.7e-04	3.6e-05	1.6e-06	1.8e-05	8.8e-05	1.3e-04
Fe-55	1.5e-06	0.0e+00	7.1e-07	3.8e-06	5.9e-06	3.0e-07	0.0e+00	1.4e-07	7.6e-07	1.2e-06
Fe-59	9.0e-06	0.0e+00	4.1e-06	2.2e-05	3.5e-05	1.8e-06	0.0e+00	8.2e-07	4.4e-06	6.8e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.2e-04	1.1e-05	6.8e-05	3.0e-04	4.2e-04	2.4e-05	2.2e-06	1.3e-05	5.9e-05	8.2e-05
Sr-89	2.8e-04	2.5e-05	1.5e-04	8.8e-04	9.4e-04	5.5e-05	5.0e-06	3.0e-05	1.3e-04	1.9e-04
Sr-90	1.0e-02	8.7e-04	5.5e-03	2.5e-02	3.4e-02	2.0e-03	1.7e-04	1.1e-03	4.8e-03	6.7e-03
Y-91	1.3e-03	1.2e-04	7.1e-04	3.2e-03	4.4e-03	2.6e-04	2.3e-05	1.4e-04	6.2e-04	8.6e-04
Zr-93	2.1e-03	1.8e-04	1.2e-03	5.2e-03	7.1e-03	4.2e-04	3.6e-05	2.3e-04	1.0e-03	1.4e-03
Zr-95	9.6e-04	8.6e-05	5.3e-04	2.3e-03	3.2e-03	1.9e-04	1.7e-05	1.0e-04	4.6e-04	6.3e-04
Nb-93m	2.7e-04	2.4e-05	1.5e-04	6.7e-04	9.3e-04	5.4e-05	4.7e-06	3.0e-05	1.3e-04	1.8e-04
Nb-94	8.0e-03	6.9e-04	4.4e-03	2.0e-02	2.7e-02	1.6e-03	1.4e-04	8.7e-04	3.9e-03	5.3e-03
Nb-95	2.1e-04	1.9e-05	1.1e-04	5.1e-04	7.3e-04	4.2e-05	3.8e-06	2.3e-05	1.0e-04	1.4e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.7e-05	0.0e+00	7.4e-06	4.3e-05	6.9e-05	3.3e-06	0.0e+00	1.5e-06	8.5e-06	1.3e-05
Sb-125	2.1e-05	0.0e+00	9.0e-06	5.2e-05	8.4e-05	4.1e-06	0.0e+00	1.8e-06	1.0e-05	1.6e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.9e-04	2.4e-05	1.9e-04	9.6e-04	1.4e-03	7.7e-05	4.7e-06	3.8e-05	1.9e-04	2.8e-04
I-129	4.0e-03	2.4e-04	2.0e-03	1.0e-02	1.5e-02	8.0e-04	4.8e-05	3.9e-04	2.0e-03	2.9e-03
I-131	7.3e-05	1.7e-06	2.2e-05	1.8e-04	3.1e-04	1.4e-05	3.4e-07	4.4e-06	3.6e-05	6.2e-05
Cs-134	3.8e-04	4.8e-06	4.2e-05	1.3e-03	2.2e-03	7.6e-05	9.5e-07	8.3e-06	2.5e-04	4.2e-04
Cs-135	4.1e-05	5.1e-07	4.5e-06	1.3e-04	2.3e-04	8.1e-06	1.0e-07	8.8e-07	2.7e-05	4.5e-05
Cs-137	2.8e-04	3.4e-06	3.0e-05	9.0e-04	1.6e-03	5.4e-05	6.8e-07	6.0e-06	1.8e-04	3.1e-04
Ba-133	5.7e-04	4.9e-05	3.1e-04	1.4e-03	1.9e-03	1.1e-04	9.8e-06	6.2e-05	2.7e-04	3.8e-04
Ce-139	3.8e-04	3.4e-05	2.1e-04	9.2e-04	1.3e-03	7.4e-05	6.6e-06	4.1e-05	1.8e-04	2.5e-04
Ce-141	4.8e-04	4.4e-05	2.6e-04	1.2e-03	1.7e-03	9.5e-05	8.7e-06	5.1e-05	2.3e-04	3.2e-04
Ce-144	8.6e-03	7.5e-04	4.7e-03	2.1e-02	2.8e-02	1.7e-03	1.5e-04	9.2e-04	4.1e-03	5.6e-03
Pm-147	1.0e-03	8.7e-05	5.5e-04	2.5e-03	3.4e-03	2.0e-04	1.7e-05	1.1e-04	4.8e-04	6.6e-04

Table F2.41 Normalized effective doses from inhalation: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	8.3e-04	7.1e-05	4.6e-04	2.0e-03	2.8e-03	1.6e-04	1.4e-05	9.0e-05	4.0e-04	5.5e-04
Eu-152	8.6e-03	7.4e-04	4.7e-03	2.1e-02	2.9e-02	1.7e-03	1.5e-04	9.3e-04	4.1e-03	5.7e-03
Eu-154	1.1e-02	9.5e-04	6.1e-03	2.7e-02	3.7e-02	2.2e-03	1.9e-04	1.2e-03	5.3e-03	7.4e-03
Eu-155	1.5e-03	1.3e-04	8.2e-04	3.6e-03	5.0e-03	2.9e-04	2.6e-05	1.6e-04	7.1e-04	9.8e-04
Gd-153	4.1e-04	3.6e-05	2.2e-04	9.9e-04	1.4e-03	8.0e-05	7.1e-06	4.4e-05	1.9e-04	2.7e-04
Tb-160	1.2e-03	1.1e-04	6.8e-04	3.0e-03	4.1e-03	2.4e-04	2.2e-05	1.3e-04	6.0e-04	8.2e-04
Tm-170	1.4e-03	1.2e-04	7.6e-04	3.4e-03	4.6e-03	2.7e-04	2.4e-05	1.5e-04	6.6e-04	9.1e-04
Tm-171	2.8e-04	2.4e-05	1.5e-04	6.9e-04	9.5e-04	5.6e-05	4.9e-06	3.0e-05	1.3e-04	1.9e-04
Ta-182	1.9e-03	1.7e-04	1.1e-03	4.7e-03	6.4e-03	3.8e-04	3.4e-05	2.1e-04	9.3e-04	1.3e-03
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	7.2e-01	6.2e-02	3.9e-01	1.8e+00	2.4e+00	1.4e-01	1.2e-02	7.8e-02	3.5e-01	4.7e-01
Ra-228	9.2e-01	7.3e-02	4.9e-01	2.3e+00	3.2e+00	1.8e-01	1.4e-02	9.7e-02	4.4e-01	6.2e-01
Ac-227	1.9e+01	1.6e+00	1.1e+01	4.7e+01	6.5e+01	3.8e+00	3.3e-01	2.1e+00	9.3e+00	1.3e+01
Th-228	1.1e+01	9.3e-01	5.9e+00	2.6e+01	3.6e+01	2.1e+00	1.8e-01	1.2e+00	5.1e+00	7.1e+00
Th-229	1.9e+01	1.6e+00	1.0e+01	4.7e+01	6.4e+01	3.8e+00	3.3e-01	2.1e+00	9.1e+00	1.3e+01
Th-230	2.3e+00	2.0e-01	1.3e+00	5.7e+00	7.8e+00	4.6e-01	4.0e-02	2.5e-01	1.1e+00	1.5e+00
Th-232	3.9e+00	3.3e-01	2.1e+00	9.4e+00	1.3e+01	7.6e-01	6.6e-02	4.2e-01	1.8e+00	2.6e+00
Pa-231	5.5e+00	4.7e-01	3.0e+00	1.4e+01	1.9e+01	1.1e+00	9.4e-02	6.0e-01	2.6e+00	3.6e+00
U-232	8.7e+00	7.4e-01	4.8e+00	2.1e+01	2.8e+01	1.7e+00	1.5e-01	9.4e-01	4.2e+00	5.8e+00
U-233	2.2e+00	1.9e-01	1.2e+00	5.4e+00	7.5e+00	4.4e-01	3.8e-02	2.4e-01	1.1e+00	1.5e+00
U-234	2.2e+00	1.9e-01	1.2e+00	5.4e+00	7.4e+00	4.3e-01	3.7e-02	2.4e-01	1.0e+00	1.4e+00
U-235	2.0e+00	1.7e-01	1.1e+00	4.8e+00	6.6e+00	3.9e-01	3.4e-02	2.1e-01	9.4e-01	1.3e+00
U-236	2.0e+00	1.7e-01	1.1e+00	5.0e+00	6.8e+00	4.0e-01	3.5e-02	2.2e-01	9.7e-01	1.3e+00
U-238	1.8e+00	1.6e-01	1.0e+00	4.5e+00	6.2e+00	3.6e-01	3.1e-02	2.0e-01	8.8e-01	1.2e+00
Np-237	4.8e+00	4.1e-01	2.6e+00	1.2e+01	1.6e+01	9.5e-01	8.3e-02	5.2e-01	2.3e+00	3.2e+00
Pu-236	2.3e+00	2.0e-01	1.3e+00	5.7e+00	7.8e+00	4.6e-01	4.0e-02	2.5e-01	1.1e+00	1.5e+00
Pu-238	3.5e+00	3.0e-01	1.9e+00	8.6e+00	1.2e+01	6.9e-01	6.1e-02	3.8e-01	1.7e+00	2.3e+00
Pu-239	2.7e+00	2.3e-01	1.5e+00	6.5e+00	9.0e+00	5.2e-01	4.6e-02	2.9e-01	1.3e+00	1.8e+00
Pu-240	2.7e+00	2.3e-01	1.5e+00	6.5e+00	9.0e+00	5.2e-01	4.6e-02	2.9e-01	1.3e+00	1.8e+00
Pu-241	2.8e-02	2.4e-03	1.5e-02	6.9e-02	9.5e-02	5.6e-03	4.8e-04	3.0e-03	1.3e-02	1.9e-02
Pu-242	2.5e+00	2.1e-01	1.4e+00	6.1e+00	8.3e+00	4.9e-01	4.2e-02	2.7e-01	1.2e+00	1.6e+00
Pu-244	2.4e+00	2.0e-01	1.3e+00	5.8e+00	8.0e+00	4.7e-01	4.1e-02	2.6e-01	1.1e+00	1.6e+00
Am-241	8.7e+00	7.4e-01	4.7e+00	2.1e+01	2.9e+01	1.7e+00	1.5e-01	9.4e-01	4.2e+00	5.7e+00
Am-242m	8.7e+00	7.4e-01	4.7e+00	2.1e+01	2.9e+01	1.7e+00	1.5e-01	9.4e-01	4.2e+00	5.8e+00
Am-243	8.7e+00	7.4e-01	4.7e+00	2.1e+01	2.9e+01	1.7e+00	1.5e-01	9.4e-01	4.2e+00	5.7e+00
Cm-242	1.0e+00	9.1e-02	5.6e-01	2.5e+00	3.4e+00	2.0e-01	1.8e-02	1.1e-01	4.9e-01	6.7e-01
Cm-243	6.4e+00	5.5e-01	3.5e+00	1.6e+01	2.2e+01	1.3e+00	1.1e-01	6.9e-01	3.1e+00	4.2e+00
Cm-244	5.4e+00	4.7e-01	3.0e+00	1.3e+01	1.8e+01	1.1e+00	9.3e-02	5.9e-01	2.6e+00	3.6e+00
Cm-245	8.7e+00	7.4e-01	4.7e+00	2.1e+01	2.9e+01	1.7e+00	1.5e-01	9.3e-01	4.2e+00	5.7e+00
Cm-246	8.7e+00	7.4e-01	4.7e+00	2.1e+01	2.9e+01	1.7e+00	1.5e-01	9.3e-01	4.2e+00	5.7e+00
Cm-247	8.0e+00	6.9e-01	4.4e+00	2.0e+01	2.7e+01	1.6e+00	1.4e-01	8.6e-01	3.9e+00	5.3e+00
Cm-248	3.0e+01	2.6e+00	1.7e+01	7.5e+01	1.0e+02	6.0e+00	5.2e-01	3.3e+00	1.5e+01	2.0e+01
Bk-249	3.2e-02	2.8e-03	1.8e-02	7.9e-02	1.1e-01	6.4e-03	5.5e-04	3.5e-03	1.6e-02	2.1e-02
Cf-248	1.8e+00	1.6e-01	1.0e+00	4.5e+00	6.2e+00	3.6e-01	3.2e-02	2.0e-01	8.8e-01	1.2e+00
Cf-249	1.4e+01	1.2e+00	7.9e+00	3.5e+01	4.9e+01	2.8e+00	2.5e-01	1.6e+00	6.9e+00	9.5e+00
Cf-250	7.0e+00	6.0e-01	3.8e+00	1.7e+01	2.4e+01	1.4e+00	1.2e-01	7.6e-01	3.4e+00	4.6e+00
Cf-251	1.5e+01	1.3e+00	8.1e+00	3.6e+01	5.0e+01	2.9e+00	2.5e-01	1.6e+00	7.1e+00	9.8e+00
Cf-252	4.1e+00	3.5e-01	2.2e+00	1.0e+01	1.4e+01	8.0e-01	7.0e-02	4.4e-01	1.9e+00	2.7e+00
Cf-254	4.7e+00	4.3e-01	2.6e+00	1.2e+01	1.6e+01	9.4e-01	8.5e-02	5.1e-01	2.3e+00	3.1e+00
Es-254	1.6e+00	1.6e-01	9.9e-01	4.4e+00	6.1e+00	3.5e-01	3.1e-02	1.9e-01	8.6e-01	1.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.42 Normalized effective doses from ingestion: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	6.9e-04	3.1e-05	4.1e-04	1.7e-03	2.4e-03	1.4e-04	6.2e-06	8.1e-05	3.3e-04	4.7e-04
P-32	2.3e-04	7.1e-06	1.0e-04	5.9e-04	9.2e-04	4.6e-05	1.4e-06	2.0e-05	1.2e-04	1.8e-04
S-35	5.3e-05	2.0e-06	2.8e-05	1.4e-04	2.0e-04	1.0e-05	4.1e-07	5.5e-06	2.9e-05	3.8e-05
Cl-36	1.3e-04	3.5e-06	6.0e-05	3.3e-04	5.0e-04	2.5e-05	7.0e-07	1.2e-05	6.7e-05	1.0e-04
K-40	1.4e-03	6.1e-05	8.2e-04	3.4e-03	4.8e-03	2.7e-04	1.2e-05	1.6e-04	6.6e-04	9.4e-04
Ca-41	1.6e-04	6.1e-06	8.4e-05	4.4e-04	5.9e-04	3.1e-05	1.2e-06	1.7e-05	8.6e-05	1.2e-04
Ca-45	3.6e-04	1.4e-05	1.9e-04	9.9e-04	1.3e-03	7.1e-05	2.8e-06	3.8e-05	2.0e-04	2.6e-04
Sc-46	6.2e-04	2.4e-05	3.3e-04	1.7e-03	2.3e-03	1.2e-04	4.9e-06	6.5e-05	3.3e-04	4.5e-04
Cr-51	1.8e-06	0.0e+00	6.7e-07	4.6e-06	7.5e-06	3.5e-07	0.0e+00	1.3e-07	9.1e-07	1.5e-06
Mn-53	8.5e-06	1.8e-07	4.0e-06	2.2e-05	3.3e-05	1.7e-06	3.6e-08	7.9e-07	4.2e-06	6.6e-06
Mn-54	1.9e-04	4.0e-06	8.9e-05	4.7e-04	7.3e-04	3.7e-05	7.8e-07	1.8e-05	9.2e-05	1.4e-04
Fe-55	2.7e-06	0.0e+00	1.1e-06	6.9e-06	1.1e-05	5.2e-07	0.0e+00	2.2e-07	1.4e-06	2.1e-06
Fe-59	8.8e-06	0.0e+00	3.7e-06	2.3e-05	3.6e-05	1.7e-06	0.0e+00	7.4e-07	4.4e-06	7.1e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.1e-04	8.4e-06	1.1e-04	5.9e-04	7.9e-04	4.2e-05	1.7e-06	2.2e-05	1.1e-04	1.5e-04
Sr-89	9.0e-04	3.6e-05	4.7e-04	2.5e-03	3.3e-03	1.8e-04	7.0e-06	9.3e-05	4.8e-04	6.5e-04
Sr-90	1.7e-02	6.5e-04	8.9e-03	4.6e-02	6.3e-02	3.3e-03	1.3e-04	1.8e-03	9.1e-03	1.2e-02
Y-91	8.8e-04	3.5e-05	4.6e-04	2.4e-03	3.2e-03	1.7e-04	6.9e-06	9.2e-05	4.7e-04	6.4e-04
Zr-93	1.5e-04	6.0e-06	8.2e-05	4.2e-04	5.7e-04	3.0e-05	1.2e-06	1.6e-05	8.3e-05	1.1e-04
Zr-95	4.6e-04	1.8e-05	2.4e-04	1.3e-03	1.7e-03	9.0e-05	3.6e-06	4.9e-05	2.5e-04	3.3e-04
Nb-93m	6.6e-05	2.5e-06	3.5e-05	1.8e-04	2.5e-04	1.3e-05	5.0e-07	6.9e-06	3.5e-05	4.8e-05
Nb-94	9.4e-04	3.6e-05	5.0e-04	2.6e-03	3.5e-03	1.8e-04	7.2e-06	9.9e-05	5.0e-04	6.8e-04
Nb-95	1.6e-04	6.6e-06	8.5e-05	4.4e-04	6.1e-04	3.2e-05	1.3e-06	1.7e-05	8.7e-05	1.2e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.6e-05	0.0e+00	6.1e-06	4.1e-05	6.6e-05	3.1e-06	0.0e+00	1.2e-06	8.1e-06	1.3e-05
Sb-125	7.2e-05	0.0e+00	4.6e-06	3.1e-05	5.1e-05	2.3e-06	0.0e+00	9.1e-07	6.0e-06	1.0e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.4e-03	3.8e-05	6.4e-04	3.7e-03	5.4e-03	2.7e-04	7.4e-06	1.3e-04	7.1e-04	1.1e-03
I-129	1.5e-02	4.1e-04	7.0e-03	4.0e-02	5.9e-02	3.0e-03	8.1e-05	1.4e-03	7.7e-03	1.2e-02
I-131	2.6e-04	3.1e-06	7.0e-05	6.4e-04	1.1e-03	5.2e-05	6.3e-07	1.4e-05	1.3e-04	2.2e-04
Cs-134	1.3e-03	8.4e-06	1.4e-04	4.1e-03	7.6e-03	2.5e-04	1.6e-06	2.8e-05	8.2e-04	1.5e-03
Cs-135	1.4e-04	9.0e-07	1.5e-05	4.5e-04	8.3e-04	2.7e-05	1.8e-07	3.1e-06	8.9e-05	1.7e-04
Cs-137	8.9e-04	5.9e-06	9.9e-05	2.9e-03	5.4e-03	1.7e-04	1.2e-06	2.0e-05	5.8e-04	1.1e-03
Ba-133	5.5e-04	2.1e-05	2.9e-04	1.5e-03	2.0e-03	1.1e-04	4.1e-06	5.8e-05	2.9e-04	3.9e-04
Ce-139	3.2e-04	4.7e-06	6.4e-05	3.3e-04	4.5e-04	2.4e-05	9.4e-07	1.3e-05	6.5e-05	8.7e-05
Ce-141	1.9e-04	7.7e-06	9.9e-05	5.1e-04	7.1e-04	3.8e-05	1.5e-06	1.9e-05	1.0e-04	1.4e-04
Ce-144	2.7e-03	1.0e-04	1.4e-03	7.3e-03	9.9e-03	5.2e-04	2.0e-05	2.8e-04	1.4e-03	1.9e-03
Pm-147	1.4e-04	5.4e-06	7.4e-05	3.8e-04	5.2e-04	2.7e-05	1.1e-06	1.5e-05	7.5e-05	1.0e-04

Table F2.42 Normalized effective doses from ingestion: Slag truck driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.4e-05	2.1e-06	2.9e-05	1.5e-04	2.0e-04	1.1e-05	4.1e-07	5.7e-06	2.9e-05	3.9e-05
Eu-152	7.7e-04	3.0e-05	4.1e-04	2.1e-03	2.8e-03	1.5e-04	5.9e-06	8.1e-05	4.1e-04	5.5e-04
Eu-154	1.1e-03	4.3e-05	5.8e-04	3.0e-03	4.0e-03	2.1e-04	8.3e-06	1.2e-04	5.9e-04	7.9e-04
Eu-155	1.7e-04	6.8e-06	9.2e-05	4.8e-04	6.4e-04	3.4e-05	1.3e-06	1.8e-05	9.4e-05	1.3e-04
Gd-153	1.3e-04	5.3e-06	7.1e-05	3.7e-04	5.0e-04	2.6e-05	1.0e-06	1.4e-05	7.3e-05	9.7e-05
Tb-160	6.3e-04	2.5e-05	3.3e-04	1.7e-03	2.3e-03	1.2e-04	5.0e-06	6.7e-05	3.4e-04	4.6e-04
Tm-170	5.9e-04	2.3e-05	3.1e-04	1.6e-03	2.2e-03	1.2e-04	4.7e-06	6.2e-05	3.2e-04	4.3e-04
Tm-171	5.8e-05	2.3e-06	3.1e-05	1.6e-04	2.2e-04	1.2e-05	4.5e-07	6.2e-06	3.2e-05	4.2e-05
Ta-182	6.7e-04	2.6e-05	3.6e-04	1.8e-03	2.5e-03	1.3e-04	5.2e-06	7.0e-05	3.6e-04	4.9e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.6e-01	6.0e-03	8.2e-02	4.3e-01	5.8e-01	3.1e-02	1.2e-03	1.6e-02	8.4e-02	1.1e-01
Ra-228	3.7e-01	1.4e-02	1.9e-01	1.0e+00	1.4e+00	7.2e-02	2.8e-03	3.9e-02	2.0e-01	2.7e-01
Ac-227	6.6e-01	2.6e-02	3.5e-01	1.8e+00	2.5e+00	1.3e-01	5.0e-03	7.0e-02	3.6e-01	4.8e-01
Th-228	5.6e-02	2.2e-03	3.0e-02	1.5e-01	2.1e-01	1.1e-02	4.3e-04	5.9e-03	3.0e-02	4.1e-02
Th-229	1.8e-01	6.8e-03	9.3e-02	4.8e-01	6.5e-01	3.5e-02	1.3e-03	1.9e-02	9.5e-02	1.3e-01
Th-230	4.8e-02	1.9e-03	2.5e-02	1.3e-01	1.8e-01	9.4e-03	3.6e-04	5.1e-03	2.6e-02	3.5e-02
Th-232	5.5e-02	2.1e-03	2.9e-02	1.5e-01	2.0e-01	1.1e-02	4.1e-04	5.8e-03	3.0e-02	4.0e-02
Pa-231	3.9e-01	1.5e-02	2.1e-01	1.1e+00	1.5e+00	7.7e-02	3.0e-03	4.2e-02	2.1e-01	2.8e-01
U-232	2.2e-02	8.6e-04	1.2e-02	6.1e-02	8.3e-02	4.4e-03	1.7e-04	2.4e-03	1.2e-02	1.6e-02
U-233	4.7e-03	1.8e-04	2.5e-03	1.3e-02	1.7e-02	9.2e-04	3.5e-05	4.9e-04	2.5e-03	3.4e-03
U-234	4.6e-03	1.8e-04	2.4e-03	1.3e-02	1.7e-02	9.0e-04	3.5e-05	4.8e-04	2.5e-03	3.3e-03
U-235	4.8e-03	1.8e-04	2.5e-03	1.3e-02	1.8e-02	9.4e-04	3.6e-05	5.0e-04	2.6e-03	3.4e-03
U-236	4.3e-03	1.7e-04	2.3e-03	1.2e-02	1.6e-02	8.5e-04	3.3e-05	4.6e-04	2.3e-03	3.1e-03
U-238	6.1e-03	2.3e-04	3.2e-03	1.7e-02	2.2e-02	1.2e-03	4.6e-05	6.4e-04	3.3e-03	4.4e-03
Np-237	6.1e-02	2.4e-03	3.2e-02	1.7e-01	2.3e-01	1.2e-02	4.6e-04	6.4e-03	3.3e-02	4.4e-02
Pu-236	4.6e-02	1.8e-03	2.5e-02	1.3e-01	1.7e-01	9.1e-03	3.5e-04	4.9e-03	2.5e-02	3.3e-02
Pu-238	1.3e-01	4.9e-03	6.7e-02	3.5e-01	4.7e-01	2.5e-02	9.6e-04	1.3e-02	6.8e-02	9.2e-02
Pu-239	1.4e-01	5.3e-03	7.3e-02	3.8e-01	5.1e-01	2.7e-02	1.0e-03	1.4e-02	7.4e-02	1.0e-01
Pu-240	1.4e-01	5.3e-03	7.3e-02	3.8e-01	5.1e-01	2.7e-02	1.0e-03	1.4e-02	7.4e-02	1.0e-01
Pu-241	2.6e-03	1.0e-04	1.4e-03	7.1e-03	9.6e-03	5.1e-04	2.0e-05	2.7e-04	1.4e-03	1.9e-03
Pu-242	1.3e-01	5.1e-03	7.0e-02	3.6e-01	4.9e-01	2.5e-02	1.0e-03	1.4e-02	7.1e-02	9.5e-02
Pu-244	1.3e-01	5.1e-03	7.0e-02	3.6e-01	4.9e-01	2.6e-02	1.0e-03	1.4e-02	7.2e-02	9.6e-02
Am-241	1.1e-01	4.3e-03	5.8e-02	3.0e-01	4.1e-01	2.2e-02	8.4e-04	1.2e-02	5.9e-02	7.9e-02
Am-242m	1.1e-01	4.3e-03	5.8e-02	3.0e-01	4.1e-01	2.2e-02	8.4e-04	1.2e-02	5.9e-02	7.9e-02
Am-243	1.1e-01	4.3e-03	5.9e-02	3.0e-01	4.1e-01	2.2e-02	8.5e-04	1.2e-02	5.9e-02	8.0e-02
Cm-242	5.8e-03	2.3e-04	3.1e-03	1.5e-02	2.2e-02	1.1e-03	4.5e-05	6.1e-04	3.1e-03	4.2e-03
Cm-243	8.2e-02	3.2e-03	4.4e-02	2.3e-01	3.1e-01	1.6e-02	6.2e-04	8.7e-03	4.4e-02	5.9e-02
Cm-244	6.6e-02	2.5e-03	3.5e-02	1.8e-01	2.4e-01	1.3e-02	5.0e-04	6.9e-03	3.6e-02	4.7e-02
Cm-245	1.2e-01	4.5e-03	6.1e-02	3.2e-01	4.3e-01	2.3e-02	8.8e-04	1.2e-02	6.2e-02	8.3e-02
Cm-246	1.2e-01	4.5e-03	6.1e-02	3.2e-01	4.3e-01	2.3e-02	8.8e-04	1.2e-02	6.2e-02	8.3e-02
Cm-247	1.0e-01	4.0e-03	5.5e-02	2.9e-01	3.9e-01	2.1e-02	7.9e-04	1.1e-02	5.7e-02	7.5e-02
Cm-248	4.2e-01	1.6e-02	2.2e-01	1.2e+00	1.6e+00	8.3e-02	3.2e-03	4.5e-02	2.3e-01	3.1e-01
Bk-249	5.3e-04	2.1e-05	2.8e-04	1.5e-03	2.0e-03	1.0e-04	4.0e-06	5.6e-05	2.9e-04	3.8e-04
Cf-248	1.5e-02	5.7e-04	7.7e-03	4.0e-02	5.4e-02	2.9e-03	1.1e-04	1.5e-03	7.8e-03	1.0e-02
Cf-249	1.9e-01	7.5e-03	1.0e-01	5.3e-01	7.2e-01	3.8e-02	1.5e-03	2.0e-02	1.0e-01	1.4e-01
Cf-250	8.8e-02	3.4e-03	4.7e-02	2.4e-01	3.3e-01	1.7e-02	6.6e-04	9.3e-03	4.7e-02	6.3e-02
Cf-251	2.0e-01	7.7e-03	1.1e-01	5.4e-01	7.4e-01	3.9e-02	1.5e-03	2.1e-02	1.1e-01	1.4e-01
Cf-252	4.8e-02	1.9e-03	2.6e-02	1.3e-01	1.8e-01	9.5e-03	3.7e-04	5.1e-03	2.6e-02	3.5e-02
Cf-254	1.5e-01	5.9e-03	7.9e-02	4.1e-01	5.5e-01	2.9e-02	1.2e-03	1.5e-02	8.0e-02	1.1e-01
Es-254	1.5e-02	5.7e-04	7.8e-03	4.0e-02	5.5e-02	2.9e-03	1.1e-04	1.5e-03	7.9e-03	1.1e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.43 Normalized effective doses from all pathways: EAF dust–bulk trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.7e+00	1.7e+00	3.8e+00	1.1e+01	1.7e+01	1.1e+00	3.4e-01	7.5e-01	2.2e+00	3.3e+00
P-32	1.1e-04	1.3e-05	6.2e-05	2.3e-04	3.4e-04	2.1e-05	2.6e-06	1.2e-05	4.6e-05	6.9e-05
S-35	8.1e-08	1.6e-08	5.3e-08	1.6e-07	2.4e-07	1.6e-08	3.7e-09	1.0e-08	3.2e-08	4.6e-08
Cl-36	6.9e-04	1.1e-04	4.4e-04	1.4e-03	2.0e-03	1.4e-04	2.2e-05	8.7e-05	2.7e-04	3.9e-04
K-40	4.4e-01	1.3e-01	2.9e-01	8.4e-01	1.3e+00	8.6e-02	2.6e-02	5.8e-02	1.7e-01	2.5e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.1e-06	2.9e-07	7.4e-07	2.2e-06	3.3e-06	2.2e-07	5.8e-08	1.4e-07	4.3e-07	6.5e-07
Sc-46	4.1e-01	1.0e-01	2.7e-01	8.1e-01	1.2e+00	8.1e-02	2.1e-02	5.4e-02	1.6e-01	2.4e-01
Cr-51	1.5e-03	2.9e-04	9.6e-04	3.1e-03	4.6e-03	3.0e-04	5.7e-05	1.9e-04	6.1e-04	9.0e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.5e-01	4.4e-02	1.0e-01	2.9e-01	4.4e-01	3.0e-02	8.9e-03	2.0e-02	5.7e-02	8.7e-02
Fe-55	3.6e-12	8.7e-13	2.4e-12	7.1e-12	1.1e-11	7.1e-13	1.8e-13	4.6e-13	1.4e-12	2.1e-12
Fe-59	5.1e-02	1.1e-02	3.3e-02	1.0e-01	1.5e-01	1.0e-02	2.3e-03	6.5e-03	2.0e-02	2.9e-02
Co-56	1.9e-01	4.5e-02	1.2e-01	3.8e-01	5.6e-01	3.7e-02	9.0e-03	2.4e-02	7.3e-02	1.1e-01
Co-57	2.5e-03	6.0e-04	1.6e-03	4.9e-03	7.4e-03	4.9e-04	1.2e-04	3.2e-04	9.7e-04	1.4e-03
Co-58	4.8e-02	1.1e-02	3.1e-02	9.6e-02	1.4e-01	9.5e-03	2.3e-03	6.2e-03	1.9e-02	2.8e-02
Co-60	1.8e-01	4.3e-02	1.2e-01	3.5e-01	5.3e-01	3.5e-02	8.6e-03	2.3e-02	6.9e-02	1.0e-01
Ni-59	1.1e-06	2.5e-07	7.0e-07	2.1e-06	3.0e-06	2.1e-07	5.0e-08	1.4e-07	4.2e-07	6.0e-07
Ni-63	9.8e-11	2.3e-11	6.5e-11	1.9e-10	2.8e-10	1.9e-11	4.7e-12	1.3e-11	3.8e-11	5.5e-11
Zn-65	2.7e+00	8.0e-01	1.8e+00	5.1e+00	7.8e+00	5.3e-01	1.6e-01	3.5e-01	1.0e+00	1.5e+00
As-73	2.0e-04	4.7e-05	1.3e-04	3.9e-04	5.8e-04	3.9e-05	9.4e-06	2.5e-05	7.6e-05	1.1e-04
Se-75	1.1e+00	3.2e-01	7.2e-01	2.1e+00	3.1e+00	2.1e-01	6.4e-02	1.4e-01	4.1e-01	6.2e-01
Sr-85	8.8e-02	2.2e-02	5.6e-02	1.7e-01	2.5e-01	1.7e-02	4.4e-03	1.1e-02	3.3e-02	4.9e-02
Sr-89	3.3e-04	8.2e-05	2.2e-04	6.6e-04	9.7e-04	6.6e-05	1.6e-05	4.3e-05	1.3e-04	1.9e-04
Sr-90	1.6e-03	4.1e-04	1.0e-03	3.1e-03	4.5e-03	3.1e-04	8.3e-05	2.0e-04	6.1e-04	9.0e-04
Y-91	1.0e-03	2.6e-04	6.8e-04	2.1e-03	3.1e-03	2.0e-04	5.2e-05	1.4e-04	4.0e-04	6.0e-04
Zr-93	4.6e-10	1.2e-10	3.1e-10	8.8e-10	1.4e-09	9.1e-11	2.5e-11	6.1e-11	1.8e-10	2.7e-10
Zr-95	2.1e-01	5.6e-02	1.4e-01	4.0e-01	6.2e-01	4.1e-02	1.1e-02	2.8e-02	8.0e-02	1.2e-01
Nb-93m	2.5e-11	6.5e-12	1.7e-11	4.8e-11	7.4e-11	4.9e-12	1.3e-12	3.3e-12	9.5e-12	1.4e-11
Nb-94	4.1e-01	1.1e-01	2.7e-01	7.8e-01	1.2e+00	8.1e-02	2.1e-02	5.4e-02	1.5e-01	2.4e-01
Nb-95	1.0e-01	2.3e-02	6.9e-02	2.1e-01	3.2e-01	2.1e-02	4.7e-03	1.4e-02	4.2e-02	6.2e-02
Mo-93	9.8e-13	2.4e-13	6.5e-13	1.9e-12	2.9e-12	1.9e-13	4.8e-14	1.3e-13	3.8e-13	5.7e-13
Tc-97	7.6e-12	1.8e-12	4.9e-12	1.5e-11	2.2e-11	1.5e-12	3.6e-13	9.8e-13	3.0e-12	4.4e-12
Tc-97m	3.1e-06	7.2e-07	2.0e-06	6.3e-06	9.0e-06	6.1e-07	1.5e-07	4.0e-07	1.2e-06	1.8e-06
Tc-99	8.3e-07	2.0e-07	5.4e-07	1.7e-06	2.4e-06	1.6e-07	4.0e-08	1.1e-07	3.3e-07	4.7e-07
Ru-103	1.8e-02	3.9e-03	1.2e-02	3.7e-02	5.3e-02	3.6e-03	7.8e-04	2.3e-03	7.3e-03	1.0e-02
Ru-106	1.4e-02	3.4e-03	9.3e-03	2.8e-02	4.1e-02	2.8e-03	6.7e-04	1.8e-03	5.4e-03	7.9e-03
Ag-108m	1.3e+00	2.5e-01	8.3e-01	2.6e+00	3.7e+00	2.5e-01	4.9e-02	1.6e-01	5.1e-01	7.3e-01
Ag-110m	2.1e+00	4.0e-01	1.3e+00	4.2e+00	5.9e+00	4.1e-01	7.9e-02	2.6e-01	8.2e-01	1.2e+00
Cd-109	2.4e-03	7.2e-04	1.6e-03	4.6e-03	7.0e-03	4.7e-04	1.4e-04	3.2e-04	9.0e-04	1.4e-03
Sn-113	1.3e-02	3.0e-03	8.5e-03	2.6e-02	3.8e-02	2.5e-03	6.2e-04	1.7e-03	5.1e-03	7.5e-03
Sb-124	8.6e-01	1.6e-01	5.5e-01	1.8e+00	2.6e+00	1.7e-01	3.2e-02	1.1e-01	3.5e-01	5.1e-01
Sb-125	2.6e-01	4.9e-02	1.7e-01	5.2e-01	7.8e-01	5.1e-02	9.9e-03	3.3e-02	1.0e-01	1.5e-01
Te-123m	2.6e-01	7.9e-02	1.8e-01	5.1e-01	7.7e-01	5.2e-02	1.6e-02	3.5e-02	9.9e-02	1.5e-01
Te-127m	1.8e-02	5.5e-03	1.2e-02	3.6e-02	5.4e-02	3.6e-03	1.1e-03	2.4e-03	6.9e-03	1.1e-02
I-125	1.0e-05	1.6e-06	6.6e-06	2.1e-05	3.2e-05	2.0e-06	3.1e-07	1.3e-06	4.2e-06	6.3e-06
I-129	3.2e-05	5.0e-06	2.1e-05	6.7e-05	9.6e-05	6.3e-06	1.0e-06	4.1e-06	1.3e-05	1.9e-05
I-131	4.2e-02	1.2e-03	1.4e-02	1.0e-01	1.6e-01	8.2e-03	2.4e-04	2.8e-03	2.0e-02	3.3e-02
Cs-134	7.8e+00	2.3e+00	5.2e+00	1.5e+01	2.3e+01	1.5e+00	4.7e-01	1.0e+00	2.9e+00	4.5e+00
Cs-135	7.6e-05	2.3e-05	5.1e-05	1.5e-04	2.2e-04	1.5e-05	4.6e-06	1.0e-05	2.9e-05	4.4e-05
Cs-137	2.9e+00	8.6e-01	1.9e+00	5.5e+00	8.5e+00	5.7e-01	1.7e-01	3.8e-01	1.1e+00	1.7e+00
Ba-133	7.5e-02	2.0e-02	4.9e-02	1.5e-01	2.2e-01	1.5e-02	3.9e-03	9.8e-03	2.9e-02	4.3e-02
Ce-139	1.4e-02	3.8e-03	9.5e-03	2.9e-02	4.3e-02	2.8e-03	7.7e-04	1.9e-03	5.7e-03	8.3e-03
Ce-141	3.8e-03	8.6e-04	2.5e-03	7.8e-03	1.1e-02	7.5e-04	1.7e-04	4.9e-04	1.5e-03	2.3e-03
Ce-144	1.1e-02	2.9e-03	7.2e-03	2.2e-02	3.2e-02	2.1e-03	5.9e-04	1.4e-03	4.3e-03	6.3e-03
Pm-147	8.6e-07	2.3e-07	5.8e-07	1.7e-06	2.5e-06	1.7e-07	4.6e-08	1.1e-07	3.4e-07	5.0e-07

Table F2.43 Normalized effective doses from all pathways: EAF dust–bulk trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.1e-09	2.8e-10	7.1e-10	2.0e-09	3.1e-09	2.1e-10	5.6e-11	1.4e-10	4.0e-10	6.1e-10
Eu-152	2.9e-01	7.7e-02	1.9e-01	5.7e-01	8.8e-01	5.8e-02	1.5e-02	3.8e-02	1.1e-01	1.7e-01
Eu-154	2.9e-01	7.5e-02	1.9e-01	5.6e-01	8.6e-01	5.7e-02	1.5e-02	3.7e-02	1.1e-01	1.7e-01
Eu-155	2.3e-03	6.1e-04	1.5e-03	4.6e-03	7.0e-03	4.6e-04	1.2e-04	3.1e-04	9.1e-04	1.4e-03
Gd-153	2.6e-03	7.0e-04	1.8e-03	5.1e-03	7.8e-03	5.2e-04	1.4e-04	3.4e-04	1.0e-03	1.5e-03
Tb-160	2.1e-01	5.4e-02	1.4e-01	4.1e-01	6.4e-01	4.2e-02	1.1e-02	2.7e-02	8.2e-02	1.2e-01
Tm-170	1.6e-04	4.9e-05	1.1e-04	3.2e-04	4.8e-04	3.2e-05	8.6e-06	2.1e-05	6.2e-05	9.6e-05
Tm-171	4.8e-06	1.3e-06	3.2e-06	9.4e-06	1.4e-05	9.5e-07	2.6e-07	6.3e-07	1.8e-06	2.8e-06
Ta-182	2.7e-01	6.9e-02	1.8e-01	5.2e-01	8.0e-01	5.3e-02	1.4e-02	3.5e-02	1.0e-01	1.6e-01
W-181	8.7e-05	2.1e-05	5.8e-05	1.7e-04	2.5e-04	1.7e-05	4.2e-06	1.1e-05	3.4e-05	4.9e-05
W-185	2.1e-06	4.9e-07	1.4e-06	4.1e-06	6.0e-06	4.1e-07	9.9e-08	2.7e-07	8.0e-07	1.2e-06
Os-185	2.5e+00	7.5e-01	1.7e+00	4.9e+00	7.4e+00	5.0e-01	1.5e-01	3.4e-01	9.6e-01	1.5e+00
Ir-192	3.6e-02	8.4e-03	2.4e-02	7.2e-02	1.1e-01	7.1e-03	1.7e-03	4.7e-03	1.4e-02	2.0e-02
Tl-204	1.6e-03	4.8e-04	1.1e-03	3.1e-03	4.7e-03	3.2e-04	9.7e-05	2.1e-04	6.1e-04	9.4e-04
Pb-210	3.9e-03	1.2e-03	2.6e-03	7.5e-03	1.1e-02	7.7e-04	2.4e-04	5.2e-04	1.5e-03	2.3e-03
Bi-207	7.6e+00	2.3e+00	5.1e+00	1.5e+01	2.2e+01	1.5e+00	4.6e-01	1.0e+00	2.9e+00	4.4e+00
Po-210	4.2e-05	1.3e-05	2.8e-05	8.2e-05	1.2e-04	8.4e-06	2.5e-06	5.6e-06	1.6e-05	2.5e-05
Ra-226	4.6e-01	1.2e-01	3.0e-01	9.0e-01	1.3e+00	9.0e-02	2.4e-02	5.9e-02	1.8e-01	2.6e-01
Ra-228	2.4e-01	6.1e-02	1.6e-01	4.6e-01	6.8e-01	4.6e-02	1.2e-02	3.1e-02	9.1e-02	1.3e-01
Ac-227	7.8e-02	2.1e-02	5.2e-02	1.5e-01	2.3e-01	1.5e-02	4.1e-03	1.0e-02	3.0e-02	4.5e-02
Th-228	3.7e-01	9.6e-02	2.4e-01	7.1e-01	1.0e+00	7.2e-02	1.9e-02	4.7e-02	1.4e-01	2.1e-01
Th-229	5.5e-02	1.4e-02	3.6e-02	1.1e-01	1.6e-01	1.1e-02	2.9e-03	7.1e-03	2.1e-02	3.2e-02
Th-230	4.0e-05	9.4e-06	2.6e-05	7.8e-05	1.2e-04	7.8e-06	1.9e-06	5.1e-06	1.5e-05	2.3e-05
Th-232	2.6e-03	4.4e-04	1.7e-03	5.4e-03	8.1e-03	5.2e-04	8.8e-05	3.3e-04	1.1e-03	1.6e-03
Pa-231	6.7e-03	1.8e-03	4.4e-03	1.3e-02	2.0e-02	1.3e-03	3.6e-04	8.7e-04	2.6e-03	3.9e-03
U-232	1.3e-02	2.2e-03	8.1e-03	2.6e-02	3.9e-02	2.5e-03	4.3e-04	1.6e-03	5.1e-03	7.6e-03
U-233	2.8e-05	7.5e-06	1.8e-05	5.5e-05	8.2e-05	5.5e-06	1.5e-06	3.6e-06	1.1e-05	1.6e-05
U-234	4.8e-06	1.3e-06	3.2e-06	9.5e-06	1.4e-05	9.5e-07	2.6e-07	6.2e-07	1.8e-06	2.8e-06
U-235	2.3e-02	6.1e-03	1.5e-02	4.5e-02	6.6e-02	4.5e-03	1.2e-03	2.9e-03	8.7e-03	1.3e-02
U-236	1.9e-06	5.0e-07	1.2e-06	3.7e-06	5.5e-06	3.7e-07	1.0e-07	2.4e-07	7.2e-07	1.1e-06
U-238	6.2e-03	1.7e-03	4.1e-03	1.2e-02	1.8e-02	1.2e-03	3.4e-04	8.1e-04	2.4e-03	3.6e-03
Np-237	4.1e-02	1.1e-02	2.7e-02	8.2e-02	1.2e-01	8.1e-03	2.1e-03	5.4e-03	1.6e-02	2.3e-02
Pu-236	8.9e-06	1.2e-06	5.3e-06	1.9e-05	2.8e-05	1.8e-06	2.4e-07	1.1e-06	3.7e-06	5.5e-06
Pu-238	6.8e-07	1.8e-07	4.6e-07	1.3e-06	2.0e-06	1.3e-07	3.6e-08	9.1e-08	2.6e-07	3.9e-07
Pu-239	7.8e-06	2.0e-06	5.2e-06	1.5e-05	2.3e-05	1.5e-06	4.1e-07	1.0e-06	3.0e-06	4.4e-06
Pu-240	6.2e-07	1.6e-07	4.2e-07	1.2e-06	1.8e-06	1.2e-07	3.3e-08	8.2e-08	2.4e-07	3.5e-07
Pu-241	1.8e-07	3.4e-08	8.9e-08	2.6e-07	3.9e-07	2.6e-08	6.9e-09	1.8e-08	5.0e-08	7.5e-08
Pu-242	6.1e-07	1.6e-07	4.1e-07	1.2e-06	1.8e-06	1.2e-07	3.2e-08	8.1e-08	2.3e-07	3.4e-07
Pu-244	8.3e-02	2.2e-02	5.5e-02	1.6e-01	2.4e-01	1.6e-02	4.4e-03	1.1e-02	3.2e-02	4.7e-02
Am-241	2.3e-04	6.1e-05	1.5e-04	4.6e-04	7.0e-04	4.6e-05	1.2e-05	3.1e-05	9.0e-05	1.4e-04
Am-242m	1.6e-03	4.2e-04	1.1e-03	3.2e-03	4.8e-03	3.2e-04	8.6e-05	2.1e-04	6.3e-04	9.5e-04
Am-243	2.4e-02	6.2e-03	1.6e-02	4.7e-02	7.1e-02	4.7e-03	1.3e-03	3.1e-03	9.2e-03	1.4e-02
Cm-242	7.4e-07	1.9e-07	4.9e-07	1.4e-06	2.2e-06	1.5e-07	3.9e-08	9.7e-08	2.8e-07	4.2e-07
Cm-243	1.7e-02	4.5e-03	1.1e-02	3.3e-02	5.0e-02	3.3e-03	9.1e-04	2.2e-03	6.5e-03	9.7e-03
Cm-244	7.2e-07	1.9e-07	4.8e-07	1.4e-06	2.1e-06	1.4e-07	3.9e-08	9.5e-08	2.8e-07	4.1e-07
Cm-245	7.3e-03	1.9e-03	4.9e-03	1.4e-02	2.1e-02	1.4e-03	3.9e-04	9.7e-04	2.8e-03	4.2e-03
Cm-246	2.8e-08	7.3e-09	1.9e-08	5.4e-08	8.0e-08	5.4e-09	1.5e-09	3.6e-09	1.1e-08	1.6e-08
Cm-247	7.4e-02	1.9e-02	4.9e-02	1.4e-01	2.1e-01	1.4e-02	3.9e-03	9.7e-03	2.8e-02	4.2e-02
Cm-248	2.4e-08	6.2e-09	1.6e-08	4.6e-08	6.9e-08	4.6e-09	1.3e-09	3.1e-09	9.0e-09	1.3e-08
Bk-249	1.3e-05	2.3e-06	8.5e-06	2.8e-05	4.0e-05	2.6e-06	4.6e-07	1.7e-06	5.4e-06	7.9e-06
Cf-248	9.6e-07	2.5e-07	6.3e-07	1.9e-06	2.8e-06	1.9e-07	5.0e-08	1.3e-07	3.7e-07	5.4e-07
Cf-249	7.3e-02	1.9e-02	4.8e-02	1.4e-01	2.1e-01	1.4e-02	3.9e-03	9.6e-03	2.9e-02	4.1e-02
Cf-250	1.3e-08	3.5e-09	8.6e-09	2.6e-08	3.7e-08	2.6e-09	6.9e-10	1.7e-09	5.1e-09	7.3e-09
Cf-251	1.3e-02	3.4e-03	8.4e-03	2.5e-02	3.7e-02	2.5e-03	6.7e-04	1.7e-03	5.0e-03	7.1e-03
Cf-252	1.1e-06	2.9e-07	7.1e-07	2.1e-06	3.1e-06	2.1e-07	5.6e-08	1.4e-07	4.2e-07	6.0e-07
Cf-254	3.2e+00	8.0e-01	2.1e+00	6.3e+00	9.3e+00	6.3e-01	1.6e-01	4.1e-01	1.2e+00	1.8e+00
Es-254	2.2e-01	5.8e-02	1.5e-01	4.4e-01	6.3e-01	4.3e-02	1.2e-02	2.9e-02	8.6e-02	1.3e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.44 Normalized effective doses from all pathways: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e+01	8.8e+00	2.0e+01	5.8e+01	9.3e+01	5.9e+00	1.8e+00	4.0e+00	1.2e+01	1.8e+01
P-32	5.5e-04	8.6e-05	3.1e-04	1.3e-03	1.7e-03	1.1e-04	1.4e-05	6.3e-05	2.5e-04	3.4e-04
S-35	7.2e-06	9.9e-07	4.0e-06	1.7e-05	2.4e-05	1.4e-06	1.9e-07	7.9e-07	3.2e-06	4.6e-06
Cl-36	3.8e-03	6.1e-04	2.4e-03	7.7e-03	1.0e-02	7.4e-04	1.2e-04	4.8e-04	1.5e-03	2.0e-03
K-40	2.3e+00	6.8e-01	1.6e+00	4.6e+00	7.5e+00	4.6e-01	1.4e-01	3.1e-01	9.0e-01	1.4e+00
Ca-41	7.5e-06	7.5e-07	4.5e-06	1.7e-05	2.6e-05	1.5e-06	1.6e-07	8.9e-07	3.2e-06	5.1e-06
Ca-45	4.0e-05	6.3e-06	2.4e-05	9.2e-05	1.4e-04	7.8e-06	1.3e-06	4.8e-06	1.8e-05	2.6e-05
Sc-46	2.1e+00	5.6e-01	1.4e+00	4.3e+00	6.5e+00	4.2e-01	1.1e-01	2.8e-01	8.5e-01	1.3e+00
Cr-51	7.6e-03	1.3e-03	5.0e-03	1.5e-02	2.2e-02	1.5e-03	2.7e-04	9.8e-04	3.0e-03	4.4e-03
Mn-53	7.0e-07	8.9e-08	4.1e-07	1.6e-06	2.3e-06	1.4e-07	1.9e-08	8.1e-08	3.1e-07	4.6e-07
Mn-54	7.9e-01	2.3e-01	5.3e-01	1.6e+00	2.4e+00	1.6e-01	4.7e-02	1.1e-01	3.0e-01	4.9e-01
Fe-55	2.4e-06	2.8e-07	1.4e-06	5.4e-06	8.1e-06	4.8e-07	5.7e-08	2.8e-07	1.1e-06	1.6e-06
Fe-59	2.8e-01	5.9e-02	1.7e-01	5.3e-01	8.2e-01	5.1e-02	1.2e-02	3.4e-02	1.0e-01	1.7e-01
Co-56	9.7e-01	2.2e-01	6.5e-01	2.0e+00	2.8e+00	1.9e-01	4.4e-02	1.3e-01	4.0e-01	5.3e-01
Co-57	1.2e-02	2.9e-03	8.1e-03	2.6e-02	3.5e-02	2.4e-03	5.7e-04	1.6e-03	5.1e-03	6.8e-03
Co-58	2.5e-01	5.8e-02	1.6e-01	5.2e-01	7.1e-01	4.9e-02	1.1e-02	3.3e-02	1.0e-01	1.4e-01
Co-60	9.3e-01	2.2e-01	6.1e-01	2.0e+00	2.6e+00	1.8e-01	4.3e-02	1.2e-01	3.7e-01	5.2e-01
Ni-59	6.0e-06	1.3e-06	3.9e-06	1.2e-05	1.7e-05	1.2e-06	2.7e-07	7.8e-07	2.3e-06	3.5e-06
Ni-63	1.6e-06	2.1e-07	9.1e-07	3.8e-06	5.3e-06	3.2e-07	4.2e-08	1.8e-07	7.5e-07	1.1e-06
Zn-65	1.4e+01	4.2e+00	9.6e+00	2.8e+01	4.4e+01	2.8e+00	8.5e-01	1.9e+00	5.5e+00	8.2e+00
As-73	1.3e-03	2.7e-04	8.2e-04	2.7e-03	3.6e-03	2.5e-04	5.6e-05	1.6e-04	5.1e-04	7.4e-04
Se-75	5.5e+00	1.6e+00	3.7e+00	1.1e+01	1.7e+01	1.1e+00	3.2e-01	7.3e-01	2.1e+00	3.1e+00
Sr-85	4.4e-01	1.1e-01	2.9e-01	8.9e-01	1.3e+00	8.6e-02	2.2e-02	5.9e-02	1.8e-01	2.5e-01
Sr-89	1.7e-03	4.1e-04	1.2e-03	3.6e-03	5.0e-03	3.4e-04	8.6e-05	2.3e-04	7.0e-04	9.8e-04
Sr-90	8.9e-03	2.3e-03	5.9e-03	1.8e-02	2.6e-02	1.8e-03	4.6e-04	1.2e-03	3.5e-03	5.2e-03
Y-91	5.4e-03	1.3e-03	3.5e-03	1.1e-02	1.6e-02	1.1e-03	2.7e-04	6.9e-04	2.1e-03	3.0e-03
Zr-93	7.8e-05	9.6e-06	4.2e-05	1.8e-04	2.9e-04	1.5e-05	1.9e-06	8.5e-06	3.6e-05	5.7e-05
Zr-95	1.1e+00	3.0e-01	7.4e-01	2.1e+00	3.2e+00	2.2e-01	5.7e-02	1.4e-01	4.2e-01	5.9e-01
Nb-93m	1.1e-05	1.4e-06	6.5e-06	2.7e-05	3.8e-05	2.2e-06	2.8e-07	1.3e-06	5.1e-06	7.5e-06
Nb-94	2.1e+00	5.5e-01	1.4e+00	4.1e+00	6.3e+00	4.2e-01	1.1e-01	2.8e-01	8.2e-01	1.3e+00
Nb-95	5.4e-01	1.2e-01	3.6e-01	1.1e+00	1.6e+00	1.1e-01	2.2e-02	7.1e-02	2.1e-01	3.2e-01
Mo-93	1.6e-05	1.6e-06	9.7e-06	4.0e-05	5.4e-05	3.2e-06	3.1e-07	1.9e-06	7.4e-06	1.1e-05
Tc-97	8.6e-07	1.0e-07	5.0e-07	1.9e-06	2.9e-06	1.7e-07	2.1e-08	9.8e-08	3.9e-07	5.7e-07
Tc-97m	2.4e-05	5.2e-06	1.5e-05	5.0e-05	7.3e-05	4.7e-06	1.0e-06	3.0e-06	1.0e-05	1.4e-05
Tc-99	1.7e-05	2.8e-06	1.1e-05	3.8e-05	5.7e-05	3.4e-06	6.0e-07	2.1e-06	7.2e-06	1.1e-05
Ru-103	9.3e-02	2.0e-02	6.0e-02	1.9e-01	2.9e-01	1.8e-02	4.2e-03	1.2e-02	3.6e-02	5.6e-02
Ru-106	7.3e-02	1.7e-02	4.9e-02	1.5e-01	2.1e-01	1.4e-02	3.4e-03	9.7e-03	2.8e-02	4.1e-02
Ag-108m	6.6e-00	1.3e+00	4.2e+00	1.3e+01	2.1e-01	1.3e+00	2.6e-01	8.5e-01	2.6e+00	4.2e+00
Ag-110m	1.1e+01	2.1e+00	6.9e+00	2.1e+01	3.4e+01	2.1e+00	4.2e-01	1.4e+00	4.1e+00	6.7e+00
Cd-109	1.4e-02	4.2e-03	9.6e-03	2.8e-02	4.1e-02	2.8e-03	8.4e-04	1.9e-03	5.4e-03	8.2e-03
Sn-113	8.5e-02	1.5e-02	4.3e-02	1.3e-01	1.9e-01	1.3e-02	2.9e-03	8.5e-03	2.6e-02	3.7e-02
Sb-124	4.4e+00	8.5e-01	2.7e+00	9.1e+00	1.4e+01	8.7e-01	1.7e-01	5.4e-01	1.9e+00	2.7e+00
Sb-125	1.3e+00	2.4e-01	8.2e-01	2.6e+00	3.9e+00	2.6e-01	5.1e-02	1.6e-01	5.1e-01	8.1e-01
Te-123m	1.3e+00	3.8e-01	9.0e-01	2.6e+00	4.2e+00	2.6e-01	7.9e-02	1.8e-01	5.1e-01	7.6e-01
Te-127m	9.7e-02	2.8e-02	6.6e-02	1.9e-01	3.0e-01	1.9e-02	5.7e-03	1.3e-02	3.7e-02	5.5e-02
I-125	1.2e-03	1.0e-04	6.8e-04	2.8e-03	4.4e-03	2.4e-04	2.0e-05	1.3e-04	5.3e-04	9.0e-04
I-129	1.3e-02	9.0e-04	6.5e-03	2.9e-02	4.5e-02	2.5e-03	1.9e-04	1.3e-03	5.8e-03	9.1e-03
I-131	2.1e-01	5.6e-03	6.5e-02	5.0e-01	8.3e-01	4.1e-02	1.2e-03	1.3e-02	9.8e-02	1.6e-01
Cs-134	4.1e+01	1.2e+01	2.8e+01	7.9e+01	1.3e+02	8.0e+00	2.4e+00	5.5e+00	1.5e+01	2.4e+01
Cs-135	1.3e-03	2.5e-04	8.3e-04	2.8e-03	4.1e-03	2.5e-04	4.9e-05	1.6e-04	5.4e-04	7.7e-04
Cs-137	1.5e+01	4.6e+00	1.0e+01	2.9e+01	4.7e+01	3.0e+00	9.0e-01	2.0e+00	5.7e+00	8.9e+00
Ba-133	3.9e-01	9.9e-02	2.5e-01	7.2e-01	1.2e+00	7.6e-02	2.0e-02	4.9e-02	1.4e-01	2.2e-01
Ce-139	7.3e-02	1.8e-02	4.8e-02	1.5e-01	2.2e-01	1.4e-02	3.7e-03	9.5e-03	2.9e-02	4.4e-02
Ce-141	1.9e-02	4.0e-03	1.2e-02	4.2e-02	6.3e-02	3.8e-03	8.2e-04	2.5e-03	7.9e-03	1.2e-02
Ce-144	5.7e-02	1.4e-02	3.7e-02	1.2e-01	1.8e-01	1.1e-02	3.0e-03	7.5e-03	2.2e-02	3.4e-02
Pm-147	4.3e-05	6.4e-06	2.5e-05	9.4e-05	1.4e-04	8.5e-06	1.2e-06	5.0e-06	1.8e-05	2.7e-05

Table F2.44 Normalized effective doses from all pathways: EAF dust-dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.0e-05	3.5e-06	1.7e-05	7.1e-05	1.0e-04	5.9e-06	7.2e-07	3.3e-06	1.4e-05	2.0e-05
Eu-152	1.5e+00	4.1e-01	1.0e+00	3.0e+00	4.5e+00	3.0e-01	8.0e-02	2.0e-01	5.9e-01	9.0e-01
Eu-154	1.5e+00	4.0e-01	1.0e+00	3.0e+00	4.5e+00	2.9e-01	7.8e-02	2.0e-01	5.7e-01	8.8e-01
Eu-155	1.2e-02	3.2e-03	8.2e-03	2.4e-02	3.6e-02	2.4e-03	6.3e-04	1.6e-03	4.6e-03	7.1e-03
Gd-153	1.4e-02	3.6e-03	9.2e-03	2.8e-02	4.0e-02	2.7e-03	7.2e-04	1.9e-03	5.3e-03	7.8e-03
Tb-160	1.1e+00	2.9e-01	7.0e-01	2.2e+00	3.6e+00	2.2e-01	5.6e-02	1.4e-01	4.3e-01	7.3e-01
Tm-170	9.0e-04	2.3e-04	6.0e-04	1.8e-03	2.7e-03	1.8e-04	4.9e-05	1.2e-04	3.6e-04	5.3e-04
Tm-171	3.9e-05	9.7e-06	2.6e-05	8.1e-05	1.1e-04	7.6e-06	1.9e-06	5.0e-06	1.6e-05	2.3e-05
Ta-182	1.4e+00	3.5e-01	9.1e-01	2.9e+00	4.3e+00	2.7e-01	7.3e-02	1.8e-01	5.5e-01	8.3e-01
W-181	4.9e-04	1.1e-04	3.2e-04	9.8e-04	1.5e-03	9.7e-05	2.3e-05	6.5e-05	2.0e-04	3.0e-04
W-185	1.3e-05	2.8e-06	8.2e-06	2.7e-05	3.7e-05	2.5e-06	5.6e-07	1.6e-06	5.2e-06	7.5e-06
Os-185	1.3e+01	3.8e+00	8.9e+00	2.6e+01	4.1e+01	2.6e+00	7.7e-01	1.8e+00	5.1e+00	7.7e+00
Ir-192	1.8e-01	4.2e-02	1.2e-01	3.7e-01	5.3e-01	3.6e-02	8.3e-03	2.4e-02	7.6e-02	1.0e-01
Tl-204	9.0e-03	2.7e-03	6.2e-03	1.8e-02	2.7e-02	1.8e-03	5.4e-04	1.2e-03	3.4e-03	5.3e-03
Pb-210	1.1e+00	1.6e-01	6.4e-01	2.5e+00	3.6e+00	2.1e-01	3.2e-02	1.3e-01	5.1e-01	7.0e-01
Bi-207	4.0e+01	1.2e+01	2.7e+01	7.7e+01	1.2e+02	7.9e+00	2.4e+00	5.4e+00	1.5e+01	2.4e+01
Po-210	4.6e-01	6.5e-02	2.7e-01	1.1e+00	1.5e+00	9.2e-02	1.3e-02	5.3e-02	2.2e-01	3.1e-01
Ra-226	2.4e+00	5.9e-01	1.6e+00	4.8e+00	7.5e+00	4.8e-01	1.2e-01	3.3e-01	9.8e-01	1.5e+00
Ra-228	1.3e+00	3.2e-01	8.7e-01	2.6e+00	4.0e+00	2.5e-01	6.6e-02	1.7e-01	5.1e-01	7.6e-01
Ac-227	1.1e+00	2.1e-01	6.7e-01	2.5e+00	3.4e+00	2.1e-01	4.3e-02	1.4e-01	5.0e-01	6.7e-01
Th-228	2.3e+00	5.8e-01	1.5e+00	4.9e+00	7.1e+00	4.6e-01	1.2e-01	2.9e-01	9.8e-01	1.4e+00
Th-229	9.5e-01	1.7e-01	5.6e-01	2.2e+00	3.2e+00	1.9e-01	3.4e-02	1.1e-01	4.5e-01	6.1e-01
Th-230	8.2e-02	9.1e-03	4.5e-02	2.0e-01	2.9e-01	1.6e-02	1.8e-03	8.7e-03	3.7e-02	6.1e-02
Th-232	1.5e-01	2.0e-02	8.5e-02	3.6e-01	5.3e-01	3.0e-02	3.9e-03	1.7e-02	7.0e-02	1.1e-01
Pa-231	2.4e-01	3.6e-02	1.3e-01	5.7e-01	7.8e-01	4.7e-02	7.1e-03	2.7e-02	1.1e-01	1.6e-01
U-232	3.7e-01	5.6e-02	2.2e-01	8.4e-01	1.3e+00	7.3e-02	1.2e-02	4.3e-02	1.7e-01	2.6e-01
U-233	7.7e-02	9.0e-03	4.1e-02	1.8e-01	2.6e-01	1.5e-02	1.8e-03	8.0e-03	3.5e-02	5.6e-02
U-234	7.5e-02	8.9e-03	4.0e-02	1.8e-01	2.6e-01	1.5e-02	1.7e-03	7.9e-03	3.4e-02	5.5e-02
U-235	1.8e-01	4.3e-02	1.2e-01	4.2e-01	6.0e-01	3.6e-02	9.1e-03	2.3e-02	7.9e-02	1.2e-01
U-236	7.0e-02	8.2e-03	3.7e-02	1.7e-01	2.4e-01	1.4e-02	1.6e-03	7.3e-03	3.2e-02	5.1e-02
U-238	9.6e-02	1.9e-02	5.9e-02	2.2e-01	3.2e-01	1.9e-02	3.9e-03	1.2e-02	4.3e-02	6.3e-02
Np-237	3.7e-01	7.9e-02	2.4e-01	8.4e-01	1.1e+00	7.3e-02	1.7e-02	4.7e-02	1.6e-01	2.2e-01
Pu-236	7.8e-02	9.1e-03	4.6e-02	1.9e-01	2.7e-01	1.6e-02	1.9e-03	9.0e-03	3.7e-02	5.4e-02
Pu-238	1.2e-01	1.4e-02	7.0e-02	2.8e-01	4.1e-01	2.4e-02	2.9e-03	1.4e-02	5.6e-02	8.3e-02
Pu-239	9.4e-02	1.1e-02	5.4e-02	2.2e-01	3.1e-01	1.8e-02	2.2e-03	1.1e-02	4.3e-02	6.3e-02
Pu-240	9.4e-02	1.1e-02	5.4e-02	2.2e-01	3.1e-01	1.8e-02	2.2e-03	1.1e-02	4.3e-02	6.3e-02
Pu-241	1.0e-03	1.2e-04	5.9e-04	2.4e-03	3.5e-03	2.0e-04	2.5e-05	1.2e-04	4.5e-04	6.9e-04
Pu-242	8.7e-02	9.9e-03	5.0e-02	2.0e-01	2.9e-01	1.7e-02	2.1e-03	1.0e-02	4.0e-02	5.8e-02
Pu-244	5.2e-01	1.3e-01	3.5e-01	1.0e+00	1.6e+00	1.0e-01	2.6e-02	6.9e-02	2.1e-01	3.1e-01
Am-241	3.0e-01	3.5e-02	1.6e-01	6.9e-01	1.1e+00	5.9e-02	6.9e-03	3.2e-02	1.4e-01	2.2e-01
Am-242m	3.1e-01	3.7e-02	1.7e-01	7.1e-01	1.1e+00	6.1e-02	7.4e-03	3.3e-02	1.4e-01	2.2e-01
Am-243	4.2e-01	7.9e-02	2.5e-01	9.4e-01	1.5e+00	8.3e-02	1.6e-02	5.1e-02	1.8e-01	2.9e-01
Cm-242	3.5e-02	4.1e-03	1.9e-02	8.5e-02	1.3e-01	6.9e-03	8.6e-04	3.7e-03	1.7e-02	2.4e-02
Cm-243	3.1e-01	5.6e-02	1.9e-01	7.1e-01	1.1e+00	6.0e-02	1.1e-02	3.8e-02	1.4e-01	2.0e-01
Cm-244	1.9e-01	2.2e-02	1.0e-01	4.6e-01	6.7e-01	3.7e-02	4.5e-03	2.0e-02	9.3e-02	1.3e-01
Cm-245	3.3e-01	5.0e-02	2.0e-01	7.8e-01	1.2e+00	6.6e-02	1.0e-02	3.9e-02	1.6e-01	2.3e-01
Cm-246	3.0e-01	3.5e-02	1.7e-01	7.4e-01	1.1e+00	5.9e-02	7.2e-03	3.2e-02	1.5e-01	2.1e-01
Cm-247	6.6e-01	1.5e-01	4.2e-01	1.4e+00	2.2e+00	1.3e-01	2.9e-02	8.2e-02	2.8e-01	4.3e-01
Cm-248	1.0e+00	1.2e-01	5.8e-01	2.6e+00	3.8e+00	2.1e-01	2.5e-02	1.1e-01	5.2e-01	7.3e-01
Bk-249	1.2e-03	1.5e-04	6.8e-04	2.9e-03	4.2e-03	2.4e-04	3.1e-05	1.3e-04	5.9e-04	8.5e-04
Cf-248	6.3e-02	6.6e-03	3.3e-02	1.5e-01	2.3e-01	1.2e-02	1.4e-03	6.6e-03	2.9e-02	4.4e-02
Cf-249	8.7e-01	1.8e-01	5.5e-01	2.0e+00	2.8e+00	1.7e-01	3.7e-02	1.1e-01	4.0e-01	5.6e-01
Cf-250	2.4e-01	2.5e-02	1.3e-01	5.8e-01	8.9e-01	4.8e-02	5.4e-03	2.5e-02	1.1e-01	1.7e-01
Cf-251	5.7e-01	7.8e-02	3.2e-01	1.3e+00	2.1e+00	1.1e-01	1.7e-02	6.2e-02	2.6e-01	3.9e-01
Cf-252	1.4e-01	1.5e-02	7.3e-02	3.4e-01	5.1e-01	2.8e-02	3.1e-03	1.5e-02	6.4e-02	9.9e-02
Cf-254	1.7e+01	4.2e+00	1.1e+01	3.4e+01	4.8e+01	3.3e+00	8.7e-01	2.2e+00	6.7e+00	9.4e+00
Es-254	1.2e+00	3.0e-01	8.1e-01	2.5e+00	3.8e+00	2.4e-01	5.1e-02	1.6e-01	4.8e-01	7.5e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.45 Normalized effective doses from external exposure: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.0e+01	8.8e+00	2.0e+01	5.8e+01	9.3e+01	5.9e+00	1.8e+00	4.0e+00	1.2e+01	1.8e+01
P-32	5.4e-04	6.6e-05	3.1e-04	1.3e-03	1.7e-03	1.1e-04	1.4e-05	6.1e-05	2.5e-04	3.4e-04
S-35	4.4e-07	9.9e-08	2.9e-07	8.6e-07	1.4e-06	8.7e-08	2.0e-08	5.8e-08	1.7e-07	2.6e-07
Cl-36	3.4e-03	5.7e-04	2.2e-03	7.0e-03	9.6e-03	6.7e-04	1.2e-04	4.3e-04	1.4e-03	1.9e-03
K-40	2.3e+00	6.8e-01	1.6e+00	4.6e+00	7.5e+00	4.6e-01	1.4e-01	3.1e-01	9.0e-01	1.4e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	5.8e-06	1.5e-06	3.8e-06	1.2e-05	1.7e-05	1.1e-06	3.0e-07	7.5e-07	2.4e-06	3.2e-06
Sc-46	2.1e+00	5.6e-01	1.4e+00	4.3e+00	6.5e+00	4.2e-01	1.1e-01	2.8e-01	8.5e-01	1.3e+00
Cr-51	7.6e-03	1.3e-03	5.0e-03	1.5e-02	2.2e-02	1.5e-03	2.7e-04	9.8e-04	3.0e-03	4.4e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	7.9e-01	2.3e-01	5.3e-01	1.6e+00	2.4e+00	1.6e-01	4.7e-02	1.1e-01	3.0e-01	4.9e-01
Fe-55	1.8e-11	4.3e-12	1.2e-11	3.6e-11	5.4e-11	3.5e-12	8.7e-13	2.3e-12	7.1e-12	1.1e-11
Fe-59	2.6e-01	5.9e-02	1.7e-01	5.3e-01	8.2e-01	5.1e-02	1.2e-02	3.4e-02	1.0e-01	1.7e-01
Co-56	9.7e-01	2.2e-01	6.5e-01	2.0e+00	2.8e+00	1.9e-01	4.4e-02	1.3e-01	4.0e-01	5.3e-01
Co-57	1.2e-02	2.9e-03	8.1e-03	2.6e-02	3.5e-02	2.4e-03	5.7e-04	1.6e-03	5.1e-03	6.8e-03
Co-58	2.5e-01	5.8e-02	1.6e-01	5.2e-01	7.1e-01	4.9e-02	1.1e-02	3.3e-02	1.0e-01	1.4e-01
Co-60	9.3e-01	2.2e-01	6.1e-01	2.0e+00	2.6e+00	1.8e-01	4.3e-02	1.2e-01	3.7e-01	5.2e-01
Ni-59	5.4e-06	1.2e-06	3.6e-06	1.0e-05	1.6e-05	1.1e-06	2.4e-07	7.2e-07	2.0e-06	3.1e-06
Ni-63	6.8e-10	1.5e-10	4.5e-10	1.3e-09	2.0e-09	1.3e-10	3.0e-11	9.0e-11	2.5e-10	3.9e-10
Zn-65	1.4e+01	4.2e+00	9.6e+00	2.8e+01	4.4e+01	2.8e+00	8.5e-01	1.9e+00	5.5e+00	8.2e+00
As-73	1.2e-03	2.6e-04	7.8e-04	2.5e-03	3.5e-03	2.4e-04	5.1e-05	1.5e-04	4.8e-04	7.0e-04
Se-75	5.5e+00	1.6e+00	3.7e+00	1.1e+01	1.7e+01	1.1e+00	3.2e-01	7.3e-01	2.1e+00	3.1e+00
Sr-85	4.4e-01	1.1e-01	2.9e-01	8.9e-01	1.3e+00	8.6e-02	2.2e-02	5.9e-02	1.8e-01	2.5e-01
Sr-89	1.7e-03	4.0e-04	1.1e-03	3.5e-03	5.0e-03	3.3e-04	8.3e-05	2.3e-04	6.9e-04	9.6e-04
Sr-90	8.0e-03	2.1e-03	5.4e-03	1.6e-02	2.4e-02	1.6e-03	4.1e-04	1.0e-03	3.1e-03	4.9e-03
Y-91	5.3e-03	1.3e-03	3.5e-03	1.1e-02	1.5e-02	1.0e-03	2.7e-04	6.8e-04	2.0e-03	3.0e-03
Zr-93	3.2e-09	8.5e-10	2.1e-09	6.2e-09	9.5e-09	6.4e-10	1.6e-10	4.2e-10	1.2e-09	1.7e-09
Zr-95	1.1e+00	3.0e-01	7.4e-01	2.1e+00	3.2e+00	2.2e-01	5.7e-02	1.4e-01	4.2e-01	5.9e-01
Nb-93m	3.8e-10	9.9e-11	2.6e-10	7.3e-10	1.1e-09	7.6e-11	2.0e-11	5.1e-11	1.5e-10	2.3e-10
Nb-94	2.1e+00	5.5e-01	1.4e+00	4.1e+00	6.3e+00	4.2e-01	1.1e-01	2.8e-01	8.2e-01	1.3e+00
Nb-95	5.4e-01	1.2e-01	3.6e-01	1.1e+00	1.6e+00	1.1e-01	2.2e-02	7.1e-02	2.1e-01	3.2e-01
Mo-93	2.0e-10	4.7e-11	1.3e-10	3.9e-10	5.2e-10	3.8e-11	9.2e-12	2.5e-11	7.5e-11	1.1e-10
Tc-97	6.6e-10	1.6e-10	4.4e-10	1.3e-09	2.1e-09	1.3e-10	3.2e-11	8.5e-11	2.6e-10	4.2e-10
Tc-97m	1.6e-05	3.6e-06	1.0e-05	3.2e-05	4.7e-05	3.1e-06	7.2e-07	2.0e-06	6.5e-06	9.6e-06
Tc-99	4.2e-06	1.0e-06	2.8e-06	8.4e-06	1.3e-05	8.4e-07	2.1e-07	5.5e-07	1.7e-06	2.7e-06
Ru-103	9.3e-02	2.0e-02	6.0e-02	1.9e-01	2.9e-01	1.8e-02	4.2e-03	1.2e-02	3.6e-02	5.6e-02
Ru-106	7.3e-02	1.7e-02	4.9e-02	1.5e-01	2.1e-01	1.4e-02	3.4e-03	9.7e-03	2.8e-02	4.0e-02
Ag-108m	6.6e+00	1.3e+00	4.2e+00	1.3e+01	2.1e+01	1.3e+00	2.6e-01	8.5e-01	2.6e+00	4.2e+00
Ag-110m	1.1e+01	2.1e+00	6.9e+00	2.1e+01	3.4e+01	2.1e+00	4.2e-01	1.4e+00	4.1e+00	6.7e+00
Cd-109	1.2e-02	3.7e-03	8.4e-03	2.5e-02	3.8e-02	2.4e-03	7.5e-04	1.7e-03	4.7e-03	7.3e-03
Sn-113	8.5e-02	1.5e-02	4.3e-02	1.3e-01	1.9e-01	1.3e-02	2.9e-03	8.5e-03	2.6e-02	3.7e-02
Sb-124	4.4e+00	8.5e-01	2.7e+00	9.1e+00	1.4e+01	8.7e-01	1.7e-01	5.4e-01	1.9e+00	2.7e+00
Sb-125	1.3e+00	2.4e-01	8.2e-01	2.6e+00	3.9e+00	2.6e-01	5.1e-02	1.6e-01	5.1e-01	8.1e-01
Te-123m	1.3e+00	3.8e-01	9.0e-01	2.6e+00	4.2e+00	2.6e-01	7.9e-02	1.8e-01	5.1e-01	7.6e-01
Te-127m	9.5e-02	2.7e-02	6.4e-02	1.9e-01	3.0e-01	1.9e-02	5.6e-03	1.3e-02	3.6e-02	5.5e-02
I-125	9.3e-05	1.4e-05	5.7e-05	2.0e-04	2.9e-04	1.8e-05	2.8e-06	1.1e-05	3.9e-05	5.8e-05
I-129	2.5e-04	3.6e-05	1.5e-04	5.6e-04	7.8e-04	5.0e-05	7.1e-06	2.9e-05	1.1e-04	1.5e-04
I-131	2.1e-01	5.6e-03	6.5e-02	5.0e-01	8.3e-01	4.1e-02	1.2e-03	1.3e-02	9.8e-02	1.6e-01
Cs-134	4.1e+01	1.2e+01	2.8e+01	7.9e+01	1.3e+02	8.0e+00	2.4e+00	5.5e+00	1.5e+01	2.4e+01
Cs-135	3.4e-04	1.0e-04	2.3e-04	6.6e-04	1.1e-03	6.7e-05	2.0e-05	4.6e-05	1.3e-04	2.0e-04
Cs-137	1.5e+01	4.6e+00	1.0e+01	2.9e+01	4.7e+01	3.0e+00	9.0e-01	2.0e+00	5.7e+00	8.9e+00
Ba-133	3.9e-01	9.9e-02	2.5e-01	7.2e-01	1.2e+00	7.6e-02	2.0e-02	4.9e-02	1.4e-01	2.2e-01
Ce-139	7.3e-02	1.8e-02	4.8e-02	1.5e-01	2.2e-01	1.4e-02	3.7e-03	9.4e-03	2.9e-02	4.4e-02
Ce-141	1.9e-02	4.0e-03	1.2e-02	4.2e-02	6.2e-02	3.8e-03	8.2e-04	2.5e-03	7.9e-03	1.2e-02
Ce-144	5.7e-02	1.4e-02	3.7e-02	1.1e-01	1.7e-01	1.1e-02	3.0e-03	7.4e-03	2.2e-02	3.3e-02
Pm-147	4.5e-06	1.2e-06	3.0e-06	9.3e-06	1.4e-05	8.9e-07	2.2e-07	6.0e-07	1.8e-06	2.7e-06

Table F2.45 Normalized effective doses from external exposure: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	7.1e-09	1.8e-09	4.7e-09	1.4e-08	1.9e-08	1.4e-09	3.7e-10	9.2e-10	2.8e-09	3.9e-09
Eu-152	1.5e+00	4.1e-01	1.0e+00	3.0e+00	4.6e+00	3.0e-01	8.0e-02	2.0e-01	5.9e-01	9.0e-01
Eu-154	1.5e+00	4.0e-01	1.0e+00	3.0e+00	4.5e+00	2.9e-01	7.8e-02	2.0e-01	5.7e-01	8.8e-01
Eu-155	1.2e-02	3.2e-03	8.1e-03	2.4e-02	3.6e-02	2.4e-03	6.3e-04	1.6e-03	4.6e-03	7.1e-03
Gd-153	1.4e-02	3.6e-03	9.1e-03	2.8e-02	3.9e-02	2.7e-03	7.2e-04	1.9e-03	5.3e-03	7.8e-03
Tb-160	1.1e+00	2.9e-01	7.0e-01	2.2e+00	3.6e+00	2.2e-01	5.6e-02	1.4e-01	4.3e-01	7.3e-01
Tm-170	8.4e-04	2.2e-04	5.5e-04	1.7e-03	2.6e-03	1.7e-04	4.3e-05	1.1e-04	3.4e-04	4.9e-04
Tm-171	2.7e-05	7.1e-06	1.8e-05	5.6e-05	8.2e-05	5.4e-06	1.5e-06	3.6e-06	1.1e-05	1.6e-05
Ta-182	1.4e+00	3.5e-01	9.1e-01	2.9e+00	4.3e+00	2.7e-01	7.3e-02	1.8e-01	5.5e-01	8.3e-01
W-181	4.9e-04	1.1e-04	3.2e-04	9.7e-04	1.5e-03	9.7e-05	2.3e-05	6.5e-05	2.0e-04	3.0e-04
W-185	1.1e-05	2.4e-06	7.0e-06	2.2e-05	3.2e-05	2.1e-06	4.8e-07	1.4e-06	4.3e-06	6.6e-06
Os-185	1.3e+01	3.8e+00	8.9e+00	2.6e+01	4.1e+01	2.6e+00	7.7e-01	1.8e+00	5.1e+00	7.7e+00
Ir-192	1.8e-01	4.2e-02	1.2e-01	3.7e-01	5.3e-01	3.6e-02	8.3e-03	2.4e-02	7.6e-02	1.0e-01
Tl-204	8.4e-03	2.5e-03	5.7e-03	1.6e-02	2.6e-02	1.7e-03	5.0e-04	1.1e-03	3.2e-03	5.0e-03
Pb-210	2.0e-02	6.1e-03	1.4e-02	3.9e-02	6.3e-02	4.0e-03	1.2e-03	2.7e-03	7.7e-03	1.2e-02
Bi-207	4.0e+01	1.2e+01	2.7e+01	7.7e+01	1.2e+02	7.8e+00	2.4e+00	5.4e+00	1.5e+01	2.4e+01
Po-210	2.2e-04	6.5e-05	1.5e-04	4.3e-04	6.8e-04	4.4e-05	1.3e-05	3.0e-05	8.8e-05	1.3e-04
Ra-226	2.4e+00	5.8e-01	1.6e+00	4.7e+00	7.4e+00	4.7e-01	1.2e-01	3.2e-01	9.6e-01	1.4e+00
Ra-228	1.2e+00	3.0e-01	8.3e-01	2.4e+00	4.0e+00	2.4e-01	6.4e-02	1.7e-01	5.0e-01	7.5e-01
Ac-227	4.0e-01	1.1e-01	2.7e-01	8.1e-01	1.3e+00	8.0e-02	2.1e-02	5.3e-02	1.5e-01	2.4e-01
Th-228	1.8e+00	5.0e-01	1.2e+00	4.0e+00	5.9e+00	3.8e-01	1.0e-01	2.5e-01	8.0e-01	1.2e+00
Th-229	2.9e-01	7.4e-02	1.8e-01	5.8e-01	8.9e-01	5.7e-02	1.5e-02	3.7e-02	1.2e-01	1.7e-01
Th-230	2.1e-04	4.9e-05	1.4e-04	4.1e-04	6.8e-04	4.2e-05	1.0e-05	2.7e-05	8.0e-05	1.4e-04
Th-232	1.5e-02	2.2e-03	8.8e-03	2.9e-02	4.8e-02	2.9e-03	4.4e-04	1.8e-03	5.9e-03	9.6e-03
Pa-231	3.5e-02	9.1e-03	2.2e-02	6.6e-02	9.8e-02	6.8e-03	1.8e-03	4.4e-03	1.3e-02	1.9e-02
U-232	6.9e-02	1.1e-02	4.1e-02	1.4e-01	2.2e-01	1.4e-02	2.2e-03	8.3e-03	2.9e-02	4.3e-02
U-233	1.5e-04	3.9e-05	9.2e-05	2.9e-04	4.4e-04	2.9e-05	7.8e-06	1.8e-05	6.0e-05	8.8e-05
U-234	2.5e-05	6.8e-06	1.6e-05	5.1e-05	7.6e-05	5.0e-06	1.4e-06	3.2e-06	1.0e-05	1.5e-05
U-235	1.2e-01	3.1e-02	7.3e-02	2.4e-01	3.5e-01	2.3e-02	6.2e-03	1.5e-02	4.7e-02	7.0e-02
U-236	9.8e-06	2.6e-06	6.2e-06	2.0e-05	3.0e-05	1.9e-06	5.3e-07	1.2e-06	4.0e-06	5.9e-06
U-238	3.3e-02	8.9e-03	2.1e-02	6.7e-02	1.0e-01	6.5e-03	1.8e-03	4.2e-03	1.4e-02	2.0e-02
Np-237	2.1e-01	5.2e-02	1.4e-01	4.1e-01	6.4e-01	4.1e-02	1.1e-02	2.7e-02	8.0e-02	1.3e-01
Pu-236	4.9e-05	5.9e-06	2.8e-05	1.0e-04	1.4e-04	9.7e-06	1.2e-06	5.5e-06	2.0e-05	2.8e-05
Pu-238	3.6e-06	9.1e-07	2.4e-06	6.8e-06	1.1e-05	7.1e-07	1.8e-07	4.7e-07	1.3e-06	2.1e-06
Pu-239	4.1e-05	1.0e-05	2.8e-05	7.7e-05	1.2e-04	8.0e-06	2.0e-06	5.3e-06	1.5e-05	2.4e-05
Pu-240	3.3e-06	8.3e-07	2.2e-06	6.2e-06	9.9e-06	6.4e-07	1.6e-07	4.3e-07	1.2e-06	1.9e-06
Pu-241	7.1e-07	1.7e-07	4.7e-07	1.3e-06	2.1e-06	1.4e-07	3.5e-08	9.3e-08	2.5e-07	4.3e-07
Pu-242	3.2e-06	8.1e-07	2.2e-06	6.1e-06	9.7e-06	6.3e-07	1.6e-07	4.2e-07	1.2e-06	1.9e-06
Pu-244	4.3e-01	1.1e-01	3.0e-01	8.2e-01	1.3e+00	8.6e-02	2.2e-02	5.7e-02	1.6e-01	2.5e-01
Am-241	1.3e-03	3.6e-04	8.4e-04	2.6e-03	4.1e-03	2.6e-04	7.2e-05	1.7e-04	5.0e-04	8.2e-04
Am-242m	8.5e-03	2.3e-03	5.4e-03	1.7e-02	2.6e-02	1.7e-03	4.6e-04	1.1e-03	3.2e-03	5.2e-03
Am-243	1.2e-01	3.3e-02	7.8e-02	2.4e-01	3.8e-01	2.4e-02	6.6e-03	1.6e-02	4.6e-02	7.5e-02
Cm-242	3.9e-06	1.0e-06	2.5e-06	7.2e-06	1.2e-05	7.6e-07	1.9e-07	4.9e-07	1.5e-06	2.5e-06
Cm-243	6.7e-02	2.3e-02	5.6e-02	1.7e-01	2.8e-01	1.7e-02	4.5e-03	1.1e-02	3.3e-02	5.5e-02
Cm-244	3.8e-06	1.0e-06	2.4e-06	7.3e-06	1.2e-05	7.5e-07	2.0e-07	4.8e-07	1.4e-06	2.4e-06
Cm-245	3.8e-02	1.0e-02	2.4e-02	7.3e-02	1.2e-01	7.4e-03	1.9e-03	4.7e-03	1.4e-02	2.4e-02
Cm-246	1.8e-07	4.8e-08	1.2e-07	3.5e-07	5.7e-07	3.5e-08	9.3e-09	2.3e-08	6.8e-08	1.1e-07
Cm-247	3.8e-01	1.0e-01	2.5e-01	7.4e-01	1.2e+00	7.5e-02	2.0e-02	4.8e-02	1.4e-01	2.4e-01
Cm-248	1.5e-07	4.1e-08	1.0e-07	3.0e-07	4.9e-07	3.1e-08	8.0e-09	2.0e-08	5.8e-08	9.8e-08
Bk-249	7.2e-05	1.2e-05	4.3e-05	1.5e-04	2.3e-04	1.4e-05	2.4e-06	8.6e-06	3.0e-05	4.6e-05
Cf-248	4.9e-06	1.3e-06	3.3e-06	1.0e-05	1.4e-05	9.7e-07	2.6e-07	6.3e-07	2.0e-06	2.8e-06
Cf-249	3.8e-01	9.7e-02	2.5e-01	7.5e-01	1.0e+00	7.4e-02	2.0e-02	4.8e-02	1.5e-01	2.2e-01
Cf-250	8.8e-08	2.3e-08	5.8e-08	1.8e-07	2.4e-07	1.7e-08	4.7e-09	1.1e-08	3.6e-08	5.0e-08
Cf-251	6.5e-02	1.7e-02	4.3e-02	1.3e-01	1.8e-01	1.3e-02	3.4e-03	8.2e-03	2.6e-02	3.7e-02
Cf-252	5.5e-06	1.4e-06	3.6e-06	1.1e-05	1.5e-05	1.1e-06	2.9e-07	7.0e-07	2.3e-06	3.1e-06
Cf-254	1.6e+01	4.2e+00	1.1e+01	3.3e+01	4.8e+01	3.2e+00	8.7e-01	2.1e+00	6.6e+00	9.3e+00
Es-254	1.2e+00	2.8e-01	7.8e-01	2.4e+00	3.6e+00	2.3e-01	5.7e-02	1.5e-01	4.6e-01	7.3e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.46 Normalized effective doses from inhalation: EAF dust-dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.2e-04	2.7e-05	1.2e-04	5.0e-04	7.7e-04	4.3e-05	5.3e-06	2.4e-05	1.0e-04	1.5e-04
P-32	1.7e-06	1.2e-07	7.6e-07	4.3e-06	6.4e-06	3.4e-07	2.4e-08	1.5e-07	8.5e-07	1.2e-06
S-35	5.5e-06	6.1e-07	2.9e-06	1.3e-05	1.8e-05	1.1e-06	1.2e-07	5.7e-07	2.6e-06	3.6e-06
Cl-36	2.5e-04	2.2e-05	1.3e-04	5.6e-04	8.4e-04	5.0e-05	4.2e-06	2.5e-05	1.1e-04	1.7e-04
K-40	3.3e-04	4.1e-05	1.8e-04	7.6e-04	1.2e-03	6.6e-05	8.0e-06	3.6e-05	1.6e-04	2.3e-04
Ca-41	2.1e-06	2.3e-07	1.1e-06	4.9e-06	7.4e-06	4.1e-07	4.5e-08	2.2e-07	1.0e-06	1.5e-06
Ca-45	2.2e-05	2.4e-06	1.2e-05	5.2e-05	7.4e-05	4.3e-06	4.9e-07	2.3e-06	1.1e-05	1.5e-05
Sc-46	3.9e-05	4.4e-06	2.2e-05	9.5e-05	1.3e-04	7.7e-06	8.9e-07	4.3e-06	1.9e-05	2.8e-05
Cr-51	8.4e-08	7.9e-09	4.2e-08	2.0e-07	2.9e-07	1.7e-08	1.6e-09	8.4e-09	3.9e-08	5.6e-08
Mn-53	2.9e-07	3.5e-08	1.6e-07	6.8e-07	1.0e-06	5.7e-08	6.9e-09	3.1e-08	1.4e-07	2.0e-07
Mn-54	8.8e-06	1.1e-06	4.9e-06	2.1e-05	3.1e-05	1.7e-06	2.2e-07	9.5e-07	4.3e-06	6.1e-06
Fe-55	9.1e-07	1.1e-07	4.9e-07	2.1e-06	3.0e-06	1.8e-07	2.2e-08	9.8e-08	4.1e-07	6.1e-07
Fe-59	5.2e-06	6.3e-07	2.9e-06	1.3e-05	1.8e-05	1.0e-06	1.3e-07	5.7e-07	2.5e-06	3.6e-06
Co-56	1.1e-05	1.1e-06	5.6e-06	2.6e-05	3.7e-05	2.1e-06	2.3e-07	1.1e-06	5.1e-06	7.4e-06
Co-57	1.6e-06	1.7e-07	8.4e-07	3.9e-06	5.7e-06	3.2e-07	3.5e-08	1.6e-07	7.6e-07	1.2e-06
Co-58	3.5e-06	3.6e-07	1.9e-06	9.0e-06	1.2e-05	7.0e-07	7.5e-08	3.7e-07	1.7e-06	2.5e-06
Co-60	4.9e-05	5.2e-06	2.5e-05	1.2e-04	1.8e-04	9.7e-06	1.1e-06	5.0e-06	2.3e-05	3.6e-05
Ni-59	2.6e-07	3.0e-08	1.5e-07	6.2e-07	9.9e-07	5.2e-08	6.1e-09	2.9e-08	1.2e-07	1.9e-07
Ni-63	8.7e-07	9.8e-08	4.8e-07	2.0e-06	3.2e-06	1.7e-07	2.0e-08	9.6e-08	4.0e-07	6.4e-07
Zn-65	5.2e-04	6.3e-05	2.9e-04	1.2e-03	1.8e-03	1.0e-04	1.3e-05	5.7e-05	2.4e-04	3.7e-04
As-73	3.8e-05	3.8e-06	2.1e-05	9.0e-05	1.4e-04	7.4e-06	7.9e-07	4.1e-06	1.7e-05	2.8e-05
Se-75	2.9e-04	3.6e-05	1.6e-04	7.1e-04	1.0e-03	5.8e-05	7.3e-06	3.2e-05	1.4e-04	2.0e-04
Sr-85	4.2e-06	4.9e-07	2.2e-06	9.9e-06	1.4e-05	8.2e-07	9.7e-08	4.4e-07	2.0e-06	2.8e-06
Sr-89	9.4e-06	1.1e-06	5.0e-06	2.2e-05	3.2e-05	1.9e-06	2.2e-07	1.0e-06	4.5e-06	6.3e-06
Sr-90	3.4e-04	4.1e-05	1.8e-04	8.2e-04	1.2e-03	6.7e-05	8.0e-06	3.6e-05	1.6e-04	2.3e-04
Y-91	4.3e-05	5.1e-06	2.3e-05	1.1e-04	1.4e-04	8.5e-06	1.1e-06	4.5e-06	2.2e-05	2.8e-05
Zr-93	7.3e-05	8.7e-06	3.9e-05	1.6e-04	2.6e-04	1.4e-05	1.8e-06	7.8e-06	3.3e-05	5.2e-05
Zr-95	3.3e-05	3.8e-06	1.7e-05	7.7e-05	1.2e-04	6.5e-06	8.1e-07	3.4e-06	1.5e-05	2.3e-05
Nb-93m	9.2e-06	1.1e-06	4.9e-06	2.2e-05	3.1e-05	1.8e-06	2.1e-07	9.9e-07	4.2e-06	5.9e-06
Nb-94	2.7e-04	3.1e-05	1.4e-04	6.3e-04	9.0e-04	5.3e-05	6.0e-06	2.9e-05	1.2e-04	1.7e-04
Nb-95	7.2e-06	7.4e-07	3.9e-06	1.8e-05	2.4e-05	1.4e-06	1.5e-07	7.6e-07	3.4e-06	4.6e-06
Mo-93	3.6e-06	4.0e-07	1.9e-06	8.3e-06	1.3e-05	7.0e-07	8.0e-08	3.7e-07	1.7e-06	2.5e-06
Tc-97	4.6e-07	5.0e-08	2.4e-07	1.1e-06	1.5e-06	9.0e-08	9.7e-09	4.8e-08	2.1e-07	3.0e-07
Tc-97m	5.8e-06	6.1e-07	3.2e-06	1.4e-05	2.0e-05	1.1e-06	1.2e-07	6.3e-07	2.8e-06	3.7e-06
Tc-99	9.1e-06	1.0e-06	4.8e-06	2.2e-05	2.9e-05	1.8e-06	1.9e-07	9.6e-07	4.3e-06	6.0e-06
Ru-103	3.5e-06	3.7e-07	1.9e-06	8.4e-06	1.3e-05	7.0e-07	7.2e-08	3.6e-07	1.7e-06	2.5e-06
Ru-106	9.6e-05	1.0e-05	4.9e-05	2.4e-04	3.3e-04	1.9e-05	2.1e-06	9.9e-06	4.5e-05	6.5e-05
Ag-108m	2.4e-04	2.1e-05	1.3e-04	5.4e-04	8.7e-04	4.8e-05	4.1e-06	2.5e-05	1.1e-04	1.7e-04
Ag-110m	2.0e-04	1.7e-05	1.1e-04	4.5e-04	7.2e-04	4.0e-05	3.4e-06	2.0e-05	8.9e-05	1.4e-04
Cd-109	9.2e-04	1.1e-04	5.1e-04	2.2e-03	3.2e-03	1.8e-04	2.3e-05	1.0e-04	4.3e-04	6.3e-04
Sn-113	4.5e-06	4.6e-07	2.3e-06	1.1e-05	1.5e-05	8.9e-07	9.5e-08	4.6e-07	2.1e-06	3.1e-06
Sb-124	8.5e-05	7.3e-06	4.5e-05	2.0e-04	2.9e-04	1.7e-05	1.5e-06	9.0e-06	3.9e-05	5.6e-05
Sb-125	1.1e-04	9.4e-06	5.7e-05	2.4e-04	3.6e-04	2.1e-05	1.8e-06	1.1e-05	4.8e-05	7.5e-05
Te-123m	5.9e-04	7.2e-05	3.2e-04	1.4e-03	2.0e-03	1.2e-04	1.5e-05	6.4e-05	2.7e-04	4.0e-04
Te-127m	1.1e-03	1.3e-04	6.0e-04	2.6e-03	3.7e-03	2.1e-04	2.7e-05	1.2e-04	5.0e-04	7.3e-04
I-125	2.5e-04	1.7e-05	1.2e-04	6.2e-04	9.7e-04	4.9e-05	3.7e-06	2.4e-05	1.2e-04	1.9e-04
I-129	2.6e-03	1.8e-04	1.3e-03	6.4e-03	1.0e-02	5.2e-04	3.6e-05	2.5e-04	1.3e-03	2.0e-03
I-131	5.3e-05	9.3e-07	1.3e-05	1.2e-04	2.2e-04	1.0e-05	1.9e-07	2.6e-06	2.3e-05	4.1e-05
Cs-134	2.0e-03	2.5e-04	1.1e-03	4.8e-03	7.0e-03	4.0e-04	4.9e-05	2.2e-04	9.5e-04	1.4e-03
Cs-135	2.1e-04	2.6e-05	1.2e-04	5.1e-04	7.4e-04	4.2e-05	5.2e-06	2.3e-05	1.0e-04	1.5e-04
Cs-137	1.4e-03	1.8e-04	8.0e-04	3.4e-03	5.0e-03	2.8e-04	3.5e-05	1.6e-04	6.9e-04	1.0e-03
Ba-133	1.9e-05	2.2e-06	1.0e-05	4.7e-05	6.3e-05	3.8e-06	4.5e-07	2.1e-06	9.5e-06	1.2e-05
Ce-139	1.3e-05	1.5e-06	6.7e-06	3.0e-05	4.7e-05	2.5e-06	3.0e-07	1.4e-06	5.8e-06	9.1e-06
Ce-141	1.7e-05	1.7e-06	8.1e-06	3.9e-05	5.8e-05	3.2e-06	3.4e-07	1.6e-06	7.6e-06	1.1e-05
Ce-144	2.9e-04	3.3e-05	1.5e-04	6.6e-04	1.1e-03	5.7e-05	6.8e-06	3.1e-05	1.3e-04	2.1e-04
Pm-147	3.4e-05	3.8e-06	1.8e-05	7.4e-05	1.1e-04	6.7e-06	7.8e-07	3.6e-06	1.5e-05	2.2e-05

Table F2.46 Normalized effective doses from inhalation: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.8e-05	3.1e-06	1.5e-05	6.5e-05	9.5e-05	5.6e-06	6.2e-07	3.0e-06	1.3e-05	1.9e-05
Eu-152	2.9e-04	3.4e-05	1.6e-04	7.1e-04	9.8e-04	5.8e-05	6.9e-06	3.2e-05	1.4e-04	1.9e-04
Eu-154	3.7e-04	4.5e-05	2.1e-04	9.2e-04	1.2e-03	7.3e-05	8.9e-06	4.1e-05	1.8e-04	2.4e-04
Eu-155	4.9e-05	6.0e-06	2.8e-05	1.2e-04	1.6e-04	9.7e-06	1.2e-06	5.5e-06	2.4e-05	3.2e-05
Gd-153	1.4e-05	1.5e-06	7.4e-06	3.4e-05	5.0e-05	2.7e-06	3.1e-07	1.5e-06	6.7e-06	9.6e-06
Tb-160	4.1e-05	4.8e-06	2.2e-05	1.0e-04	1.4e-04	8.2e-06	9.3e-07	4.4e-06	2.0e-05	2.7e-05
Tm-170	4.6e-05	5.1e-06	2.6e-05	1.1e-04	1.6e-04	9.0e-06	1.0e-06	5.0e-06	2.2e-05	3.1e-05
Tm-171	9.3e-06	1.0e-06	5.1e-06	2.3e-05	3.3e-05	1.8e-06	2.0e-07	1.0e-06	4.6e-06	6.5e-06
Ta-182	6.4e-05	7.4e-06	3.6e-05	1.5e-04	2.3e-04	1.3e-05	1.6e-06	6.9e-06	2.9e-05	4.5e-05
W-181	1.0e-07	1.1e-08	5.1e-08	2.6e-07	3.7e-07	2.0e-08	2.2e-09	1.0e-08	5.2e-08	7.4e-08
W-185	4.6e-07	4.9e-08	2.4e-07	1.2e-06	1.7e-06	9.2e-08	9.9e-09	4.8e-08	2.4e-07	3.4e-07
Os-185	1.8e-04	2.2e-05	1.0e-04	4.4e-04	6.3e-04	3.6e-05	4.4e-06	1.9e-05	8.5e-05	1.2e-04
Ir-192	1.0e-05	1.1e-06	5.3e-06	2.4e-05	3.4e-05	2.0e-06	2.3e-07	1.1e-06	4.7e-06	6.7e-06
Tl-204	1.3e-04	1.6e-05	7.2e-05	3.1e-04	4.5e-04	2.6e-05	3.2e-06	1.4e-05	6.2e-05	9.0e-05
Pb-210	7.1e-01	8.7e-02	3.9e-01	1.7e+00	2.5e+00	1.4e-01	1.8e-02	7.7e-02	3.4e-01	4.9e-01
Bi-207	6.8e-04	8.4e-05	3.8e-04	1.6e-03	2.4e-03	1.3e-04	1.7e-05	7.4e-05	3.2e-04	4.7e-04
Po-210	3.9e-01	4.8e-02	2.2e-01	9.4e-01	1.4e+00	7.7e-02	9.7e-03	4.3e-02	1.8e-01	2.7e-01
Ra-226	2.4e-02	2.8e-03	1.3e-02	5.9e-02	8.0e-02	4.8e-03	5.4e-04	2.6e-03	1.2e-02	1.6e-02
Ra-228	3.1e-02	3.5e-03	1.7e-02	7.7e-02	1.1e-01	6.2e-03	6.4e-04	3.3e-03	1.4e-02	2.0e-02
Ac-227	6.5e-01	7.3e-02	3.4e-01	1.6e+00	2.3e+00	1.3e-01	1.5e-02	7.0e-02	3.1e-01	4.6e-01
Th-228	3.7e-01	3.9e-02	2.0e-01	8.9e-01	1.3e+00	7.3e-02	7.9e-03	4.0e-02	1.7e-01	2.7e-01
Th-229	8.6e-01	7.1e-02	3.6e-01	1.6e+00	2.3e+00	1.3e-01	1.4e-02	7.1e-02	3.0e-01	4.9e-01
Th-230	8.0e-02	8.6e-03	4.4e-02	2.0e-01	2.8e-01	1.6e-02	1.7e-03	8.6e-03	3.6e-02	5.9e-02
Th-232	1.3e-01	1.4e-02	7.3e-02	3.3e-01	4.6e-01	2.6e-02	2.9e-03	1.4e-02	6.0e-02	9.8e-02
Pa-231	1.9e-01	2.2e-02	1.0e-01	4.7e-01	6.5e-01	3.7e-02	4.4e-03	2.0e-02	9.0e-02	1.3e-01
U-232	3.0e-01	3.5e-02	1.6e-01	7.1e-01	1.1e+00	5.9e-02	6.9e-03	3.1e-02	1.4e-01	2.2e-01
U-233	7.6e-02	9.0e-03	4.1e-02	1.8e-01	2.6e-01	1.5e-02	1.8e-03	7.9e-03	3.5e-02	5.6e-02
U-234	7.5e-02	8.8e-03	4.0e-02	1.8e-01	2.6e-01	1.5e-02	1.7e-03	7.8e-03	3.4e-02	5.5e-02
U-235	6.7e-02	7.9e-03	3.6e-02	1.6e-01	2.3e-01	1.3e-02	1.6e-03	7.0e-03	3.1e-02	5.0e-02
U-236	7.0e-02	8.2e-03	3.7e-02	1.7e-01	2.4e-01	1.4e-02	1.6e-03	7.3e-03	3.2e-02	5.1e-02
U-238	6.3e-02	7.4e-03	3.4e-02	1.5e-01	2.2e-01	1.2e-02	1.5e-03	6.6e-03	2.9e-02	4.6e-02
Np-237	1.6e-01	1.8e-02	9.2e-02	3.8e-01	5.8e-01	3.1e-02	3.6e-03	1.8e-02	7.3e-02	1.1e-01
Pu-236	7.8e-02	8.7e-03	4.5e-02	1.8e-01	2.6e-01	1.5e-02	1.8e-03	8.8e-03	3.6e-02	5.2e-02
Pu-238	1.2e-01	1.3e-02	6.8e-02	2.8e-01	4.0e-01	2.3e-02	2.7e-03	1.3e-02	5.5e-02	7.9e-02
Pu-239	6.9e-02	1.0e-02	5.1e-02	2.1e-01	3.0e-01	1.8e-02	2.0e-03	1.0e-02	4.1e-02	6.0e-02
Pu-240	6.9e-02	1.0e-02	5.1e-02	2.1e-01	3.0e-01	1.8e-02	2.0e-03	1.0e-02	4.1e-02	6.0e-02
Pu-241	9.4e-04	1.0e-04	5.4e-04	2.2e-03	3.2e-03	1.9e-04	2.1e-05	1.1e-04	4.4e-04	6.4e-04
Pu-242	8.3e-02	9.3e-03	4.7e-02	2.0e-01	2.8e-01	1.6e-02	1.9e-03	9.4e-03	3.8e-02	5.5e-02
Pu-244	8.0e-02	9.0e-03	4.5e-02	1.9e-01	2.7e-01	1.6e-02	1.8e-03	9.0e-03	3.7e-02	5.3e-02
Am-241	2.9e-01	3.3e-02	1.6e-01	6.9e-01	1.1e+00	5.8e-02	6.7e-03	3.1e-02	1.3e-01	2.1e-01
Am-242m	3.0e-01	3.3e-02	1.6e-01	6.9e-01	1.1e+00	5.8e-02	6.7e-03	3.1e-02	1.3e-01	2.1e-01
Am-243	2.9e-01	3.3e-02	1.6e-01	6.9e-01	1.1e+00	5.8e-02	6.7e-03	3.1e-02	1.3e-01	2.1e-01
Cm-242	3.5e-02	4.1e-03	1.9e-02	8.5e-02	1.3e-01	6.8e-03	8.5e-04	3.7e-03	1.7e-02	2.4e-02
Cm-243	2.2e-01	2.5e-02	1.2e-01	5.4e-01	7.8e-01	4.3e-02	5.1e-03	2.3e-02	1.1e-01	1.5e-01
Cm-244	1.8e-01	2.2e-02	1.0e-01	4.6e-01	6.6e-01	3.6e-02	4.4e-03	2.0e-02	9.0e-02	1.3e-01
Cm-245	2.9e-01	3.4e-02	1.6e-01	7.3e-01	1.0e+00	5.8e-02	6.9e-03	3.1e-02	1.4e-01	2.0e-01
Cm-246	2.9e-01	3.4e-02	1.6e-01	7.3e-01	1.0e+00	5.8e-02	6.9e-03	3.1e-02	1.4e-01	2.0e-01
Cm-247	2.7e-01	3.2e-02	1.5e-01	6.7e-01	9.7e-01	5.4e-02	6.4e-03	2.9e-02	1.3e-01	1.9e-01
Cm-248	1.0e+00	1.2e-01	5.7e-01	2.6e+00	3.7e+00	2.0e-01	2.4e-02	1.1e-01	5.1e-01	7.2e-01
Bk-249	1.1e-03	1.3e-04	6.1e-04	2.8e-03	4.0e-03	2.2e-04	2.5e-05	1.2e-04	5.4e-04	7.9e-04
Cf-248	6.3e-02	6.5e-03	3.2e-02	1.5e-01	2.2e-01	1.2e-02	1.4e-03	6.5e-03	2.9e-02	4.4e-02
Cf-249	4.9e-01	5.1e-02	2.6e-01	1.2e+00	1.8e+00	9.7e-02	1.1e-02	5.1e-02	2.3e-01	3.5e-01
Cf-250	2.4e-01	2.5e-02	1.2e-01	5.7e-01	8.7e-01	4.7e-02	5.2e-03	2.5e-02	1.1e-01	1.7e-01
Cf-251	5.0e-01	5.2e-02	2.6e-01	1.2e+00	1.8e+00	9.9e-02	1.1e-02	5.2e-02	2.3e-01	3.6e-01
Cf-252	1.4e-01	1.4e-02	7.1e-02	3.3e-01	5.0e-01	2.7e-02	3.0e-03	1.4e-02	6.3e-02	9.8e-02
Cf-254	1.6e-01	1.8e-02	8.5e-02	3.7e-01	5.8e-01	3.2e-02	3.6e-03	1.7e-02	7.5e-02	1.1e-01
Es-254	5.0e-02	6.8e-03	3.4e-02	1.4e-01	2.1e-01	1.2e-02	1.4e-03	6.7e-03	2.7e-02	4.0e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.47 Normalized effective doses from ingestion: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.9e-04	2.2e-05	3.3e-04	1.3e-03	2.1e-03	1.2e-04	4.5e-06	6.5e-05	2.6e-04	3.9e-04
P-32	6.3e-06	1.5e-07	2.9e-06	1.5e-05	2.6e-05	1.2e-06	2.8e-08	5.8e-07	3.0e-06	5.1e-06
S-35	1.2e-06	3.9e-08	6.4e-07	3.0e-06	4.1e-06	2.3e-07	7.7e-09	1.3e-07	5.8e-07	8.2e-07
Cl-36	7.6e-05	2.2e-06	4.4e-05	1.8e-04	2.7e-04	1.5e-05	4.7e-07	8.6e-06	3.4e-05	5.2e-05
K-40	1.2e-03	4.3e-05	6.6e-04	2.6e-03	4.0e-03	2.3e-04	9.9e-06	1.3e-04	5.2e-04	7.7e-04
Ca-41	5.4e-06	2.2e-07	3.0e-06	1.2e-05	1.9e-05	1.1e-06	4.5e-08	6.0e-07	2.4e-06	3.8e-06
Ca-45	1.2e-05	4.5e-07	6.7e-06	2.7e-05	4.3e-05	2.4e-06	9.5e-08	1.4e-06	5.3e-06	8.6e-06
Sc-46	2.1e-05	7.4e-07	1.2e-05	4.6e-05	7.5e-05	4.1e-06	1.4e-07	2.2e-06	9.2e-06	1.4e-05
Cr-51	1.5e-07	4.2e-09	7.9e-08	3.4e-07	5.3e-07	2.9e-08	8.4e-10	1.6e-08	6.5e-08	1.1e-07
Mn-53	4.1e-07	1.6e-08	2.3e-07	9.4e-07	1.4e-06	8.1e-08	3.3e-09	4.5e-08	1.9e-07	2.7e-07
Mn-54	8.9e-06	3.5e-07	5.0e-06	2.1e-05	3.0e-05	1.8e-06	7.5e-08	9.9e-07	4.0e-06	5.9e-06
Fe-55	1.5e-06	5.7e-08	8.7e-07	3.4e-06	5.5e-06	3.0e-07	1.0e-08	1.7e-07	7.1e-07	1.1e-06
Fe-59	5.0e-06	1.8e-07	2.7e-06	1.1e-05	1.8e-05	9.8e-07	3.6e-08	5.4e-07	2.2e-06	3.8e-06
Co-56	8.2e-06	3.1e-07	4.4e-06	1.9e-05	3.2e-05	1.6e-06	5.4e-08	9.0e-07	3.7e-06	6.0e-06
Co-57	8.4e-07	3.2e-08	4.6e-07	1.9e-06	3.1e-06	1.7e-07	6.2e-09	9.2e-08	3.7e-07	6.1e-07
Co-58	2.4e-06	9.4e-08	1.3e-06	5.5e-06	9.7e-06	4.8e-07	1.6e-08	2.6e-07	1.1e-06	1.7e-06
Co-60	1.2e-05	4.7e-07	6.5e-06	2.7e-05	4.4e-05	2.4e-06	8.7e-08	1.3e-06	5.4e-06	8.4e-06
Ni-59	3.0e-07	1.1e-08	1.7e-07	7.2e-07	1.1e-06	6.0e-08	2.0e-09	3.2e-08	1.4e-07	2.1e-07
Ni-63	7.2e-07	2.5e-08	4.0e-07	1.7e-06	2.6e-06	1.4e-07	4.7e-09	7.6e-08	3.3e-07	5.0e-07
Zn-65	1.2e-03	4.7e-05	7.1e-04	2.9e-03	4.3e-03	2.4e-04	1.0e-05	1.4e-04	5.6e-04	7.9e-04
As-73	2.6e-05	8.6e-07	1.4e-05	6.1e-05	8.5e-05	5.0e-06	1.7e-07	2.8e-06	1.2e-05	1.8e-05
Se-75	7.6e-04	3.0e-05	4.4e-04	1.8e-03	2.6e-03	1.5e-04	6.3e-06	8.6e-05	3.5e-04	5.0e-04
Sr-85	7.1e-06	2.5e-07	3.9e-06	1.7e-05	2.6e-05	1.4e-06	4.9e-08	7.8e-07	3.3e-06	4.8e-06
Sr-89	3.0e-05	1.0e-06	1.6e-05	7.2e-05	1.0e-04	5.8e-06	2.1e-07	3.3e-06	1.4e-05	2.0e-05
Sr-90	5.6e-04	2.1e-05	3.1e-04	1.3e-03	2.0e-03	1.1e-04	4.1e-06	6.2e-05	2.6e-04	4.0e-04
Y-91	2.9e-05	9.8e-07	1.6e-05	6.7e-05	1.0e-04	5.7e-06	1.9e-07	3.1e-06	1.3e-05	2.0e-05
Zr-93	5.3e-06	1.9e-07	3.0e-06	1.3e-05	1.8e-05	1.0e-06	3.9e-08	5.9e-07	2.4e-06	3.5e-06
Zr-95	1.6e-05	5.5e-07	8.9e-06	3.6e-05	5.2e-05	3.1e-06	1.1e-07	1.7e-06	7.0e-06	1.0e-05
Nb-93m	2.2e-06	8.2e-08	1.2e-06	4.9e-06	7.4e-06	4.3e-07	1.8e-08	2.4e-07	9.5e-07	1.4e-06
Nb-94	3.1e-05	1.2e-06	1.8e-05	7.0e-05	1.0e-04	6.1e-06	2.5e-07	3.4e-06	1.4e-05	2.1e-05
Nb-95	5.3e-06	1.9e-07	3.0e-06	1.3e-05	1.9e-05	1.1e-06	3.8e-08	5.8e-07	2.5e-06	3.8e-06
Mo-93	1.3e-05	4.2e-07	7.5e-06	3.1e-05	4.3e-05	2.5e-06	8.2e-08	1.4e-06	5.9e-06	8.6e-06
Tc-97	4.0e-07	1.5e-08	2.3e-07	9.4e-07	1.4e-06	7.9e-08	2.8e-09	4.6e-08	1.8e-07	2.7e-07
Tc-97m	2.4e-06	8.9e-08	1.4e-06	5.5e-06	8.8e-06	4.8e-07	1.7e-08	2.7e-07	1.1e-06	1.6e-06
Tc-99	3.8e-06	1.4e-07	2.2e-06	8.8e-06	1.3e-05	7.4e-07	2.6e-08	4.3e-07	1.7e-06	2.5e-06
Ru-103	2.0e-06	6.1e-08	1.0e-06	4.2e-06	7.6e-06	3.9e-07	1.2e-08	2.0e-07	8.7e-07	1.5e-06
Ru-106	3.3e-05	1.3e-06	1.8e-05	7.6e-05	1.1e-04	6.4e-06	2.5e-07	3.5e-06	1.5e-05	2.4e-05
Ag-108m	1.3e-04	4.0e-06	7.0e-05	2.9e-04	4.6e-04	2.6e-05	8.6e-07	1.4e-05	5.7e-05	9.2e-05
Ag-110m	1.4e-04	4.4e-06	7.7e-05	3.2e-04	4.9e-04	2.8e-05	9.1e-07	1.5e-05	6.1e-05	9.9e-05
Cd-109	7.1e-04	2.8e-05	4.1e-04	1.6e-03	2.5e-03	1.4e-04	5.8e-06	8.1e-05	3.2e-04	4.6e-04
Sn-113	3.0e-06	1.1e-07	1.6e-06	7.2e-06	1.0e-05	5.8e-07	2.1e-08	3.2e-07	1.4e-06	2.0e-06
Sb-124	7.7e-05	1.9e-06	4.2e-05	1.9e-04	2.9e-04	1.5e-05	4.3e-07	8.1e-06	3.6e-05	6.1e-05
Sb-125	5.9e-05	1.6e-06	3.1e-05	1.4e-04	2.1e-04	1.2e-05	3.2e-07	6.0e-06	2.7e-05	4.2e-05
Te-123m	4.1e-04	1.6e-05	2.4e-04	9.5e-04	1.4e-03	8.1e-05	3.4e-06	4.6e-05	1.9e-04	2.7e-04
Te-127m	7.1e-04	2.8e-05	4.2e-04	1.6e-03	2.4e-03	1.4e-04	5.9e-06	8.0e-05	3.2e-04	4.6e-04
I-125	8.9e-04	2.7e-05	4.1e-04	2.1e-03	3.5e-03	1.7e-04	5.0e-06	8.4e-05	4.1e-04	7.1e-04
I-129	9.8e-03	2.7e-04	4.5e-03	2.2e-02	3.9e-02	1.9e-03	5.6e-05	8.9e-04	4.3e-03	7.4e-03
I-131	1.8e-04	1.5e-06	4.1e-05	4.5e-04	7.8e-04	3.5e-05	2.9e-07	8.3e-06	8.5e-05	1.5e-04
Cs-134	8.7e-03	2.6e-04	3.9e-03	1.6e-02	2.3e-02	1.3e-03	5.5e-05	7.6e-04	3.0e-03	4.3e-03
Cs-135	7.3e-04	2.8e-05	4.2e-04	1.7e-03	2.5e-03	1.4e-04	5.9e-06	8.3e-05	3.3e-04	4.7e-04
Cs-137	4.8e-03	1.8e-04	2.8e-03	1.1e-02	1.6e-02	9.4e-04	3.8e-05	5.4e-04	2.1e-03	3.1e-03
Ba-133	1.8e-05	6.4e-07	1.0e-05	4.2e-05	6.4e-05	3.6e-06	1.3e-07	2.1e-06	8.1e-06	1.2e-05
Ce-139	4.0e-06	1.4e-07	2.2e-06	9.5e-06	1.4e-05	7.8e-07	2.8e-08	4.4e-07	1.9e-06	2.7e-06
Ce-141	6.3e-06	2.1e-07	3.3e-06	1.5e-05	2.2e-05	1.2e-06	4.1e-08	6.8e-07	3.1e-06	4.3e-06
Ce-144	8.8e-05	3.0e-06	4.9e-05	2.1e-04	3.0e-04	1.7e-05	5.9e-07	9.7e-06	4.1e-05	5.9e-05
Pm-147	4.6e-06	1.6e-07	2.6e-06	1.1e-05	1.6e-05	9.2e-07	3.0e-08	5.1e-07	2.1e-06	3.1e-06

Table F2.47 Normalized effective doses from ingestion: EAF dust–dump trailer

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.8e-06	6.3e-08	1.0e-06	4.4e-06	6.4e-06	3.6e-07	1.2e-08	2.0e-07	8.5e-07	1.2e-06
Eu-152	2.6e-05	1.1e-06	1.5e-05	6.8e-05	8.5e-05	5.1e-06	2.0e-07	2.9e-06	1.2e-05	1.7e-05
Eu-154	3.7e-05	1.5e-06	2.1e-05	8.3e-05	1.2e-04	7.2e-06	2.8e-07	4.1e-06	1.7e-05	2.4e-05
Eu-155	5.8e-06	2.4e-07	3.3e-06	1.3e-05	1.9e-05	1.1e-06	4.5e-08	6.5e-07	2.7e-06	3.8e-06
Gd-153	4.5e-06	1.7e-07	2.6e-06	1.1e-05	1.5e-05	8.8e-07	3.3e-08	5.2e-07	2.1e-06	2.9e-06
Tb-160	2.1e-05	7.9e-07	1.2e-05	4.8e-05	7.3e-05	4.1e-06	1.7e-07	2.3e-06	9.2e-06	1.4e-05
Tm-170	1.9e-05	7.4e-07	1.1e-05	4.8e-05	6.8e-05	3.8e-06	1.4e-07	2.2e-06	9.1e-06	1.3e-05
Tm-171	1.9e-06	7.1e-08	1.1e-06	4.6e-06	6.5e-06	3.8e-07	1.3e-08	2.1e-07	8.9e-07	1.3e-06
Ta-182	2.2e-05	8.6e-07	1.2e-05	5.0e-05	7.9e-05	4.4e-06	1.6e-07	2.4e-06	9.9e-06	1.6e-05
W-181	3.0e-07	9.7e-09	1.7e-07	7.2e-07	1.1e-06	6.0e-08	2.0e-09	3.4e-08	1.4e-07	2.2e-07
W-185	1.6e-06	5.0e-08	8.7e-07	3.7e-06	5.7e-06	3.1e-07	1.0e-08	1.7e-07	7.4e-07	1.1e-06
Os-185	1.4e-04	5.6e-06	8.3e-05	3.2e-04	4.8e-04	2.8e-05	1.1e-06	1.6e-05	6.5e-05	9.3e-05
Ir-192	4.8e-06	1.6e-07	2.7e-06	1.1e-05	1.6e-05	9.5e-07	3.0e-08	5.3e-07	2.2e-06	3.2e-06
Tl-204	4.6e-04	1.8e-05	2.7e-04	1.1e-03	1.6e-03	9.1e-05	3.7e-06	5.2e-05	2.1e-04	3.0e-04
Pb-210	3.3e-01	1.3e-02	1.9e-01	7.6e-01	1.1e+00	6.5e-02	2.7e-03	3.8e-02	1.5e-01	2.1e-01
Bi-207	4.7e-04	1.8e-05	2.7e-04	1.1e-03	1.6e-03	9.3e-05	3.6e-06	5.3e-05	2.1e-04	3.0e-04
Po-210	7.2e-02	2.8e-03	4.2e-02	1.7e-01	2.5e-01	1.4e-02	5.1e-04	8.2e-03	3.3e-02	4.7e-02
Ra-226	5.3e-03	2.0e-04	3.0e-03	1.2e-02	2.0e-02	1.0e-03	3.8e-05	5.8e-04	2.4e-03	3.8e-03
Ra-228	1.2e-02	4.7e-04	7.1e-03	2.8e-02	4.8e-02	2.4e-03	8.9e-05	1.4e-03	5.5e-03	9.1e-03
Ac-227	2.2e-02	9.0e-04	1.3e-02	5.4e-02	8.3e-02	4.4e-03	1.8e-04	2.5e-03	1.0e-02	1.6e-02
Th-228	1.9e-03	6.5e-05	1.1e-03	4.6e-03	7.0e-03	3.8e-04	1.3e-05	2.0e-04	9.1e-04	1.3e-03
Th-229	8.0e-03	2.0e-04	3.4e-03	1.4e-02	2.2e-02	1.2e-03	4.0e-05	6.2e-04	2.8e-03	4.1e-03
Th-230	1.6e-03	5.4e-05	9.1e-04	3.9e-03	5.9e-03	3.2e-04	1.1e-05	1.7e-04	7.5e-04	1.1e-03
Th-232	1.9e-03	5.9e-05	1.0e-03	4.5e-03	6.6e-03	3.7e-04	1.2e-05	2.0e-04	8.4e-04	1.3e-03
Pa-231	1.3e-02	4.8e-04	7.3e-03	2.9e-02	4.3e-02	2.6e-03	1.1e-04	1.4e-03	5.6e-03	8.7e-03
U-232	7.6e-04	2.6e-05	4.2e-04	1.7e-03	2.7e-03	1.5e-04	5.4e-06	8.2e-05	3.3e-04	5.2e-04
U-233	1.6e-04	5.5e-06	8.9e-05	3.5e-04	5.9e-04	3.1e-05	1.2e-06	1.7e-05	6.9e-05	1.1e-04
U-234	1.5e-04	5.4e-06	8.7e-05	3.5e-04	5.8e-04	3.0e-05	1.2e-06	1.7e-05	6.7e-05	1.0e-04
U-235	1.6e-04	5.6e-06	9.0e-05	3.7e-04	6.0e-04	3.2e-05	1.2e-06	1.8e-05	7.0e-05	1.1e-04
U-236	1.5e-04	5.1e-06	8.3e-05	3.4e-04	5.5e-04	2.9e-05	1.1e-06	1.6e-05	6.4e-05	1.0e-04
U-238	2.0e-04	7.1e-06	1.2e-04	4.7e-04	7.6e-04	4.0e-05	1.5e-06	2.3e-05	8.9e-05	1.4e-04
Np-237	2.0e-03	8.1e-05	1.1e-03	4.7e-03	7.1e-03	4.0e-04	1.7e-05	2.2e-04	9.1e-04	1.4e-03
Pu-236	1.5e-03	5.5e-05	8.5e-04	3.5e-03	5.1e-03	3.0e-04	1.1e-05	1.7e-04	6.7e-04	9.8e-04
Pu-238	4.2e-03	1.5e-04	2.3e-03	9.5e-03	1.4e-02	8.2e-04	3.1e-05	4.6e-04	1.8e-03	2.7e-03
Pu-239	4.5e-03	1.6e-04	2.5e-03	1.0e-02	1.5e-02	8.9e-04	3.4e-05	5.0e-04	2.0e-03	2.9e-03
Pu-240	4.5e-03	1.6e-04	2.5e-03	1.0e-02	1.5e-02	8.9e-04	3.4e-05	5.0e-04	2.0e-03	2.9e-03
Pu-241	8.5e-05	3.1e-06	4.8e-05	1.9e-04	2.9e-04	1.7e-05	6.3e-07	9.4e-06	3.7e-05	5.5e-05
Pu-242	4.3e-03	1.6e-04	2.4e-03	9.9e-03	1.5e-02	8.6e-04	3.2e-05	4.8e-04	1.9e-03	2.8e-03
Pu-244	4.4e-03	1.6e-04	2.4e-03	1.0e-02	1.5e-02	8.6e-04	3.2e-05	4.8e-04	1.9e-03	2.8e-03
Am-241	3.7e-03	1.3e-04	2.1e-03	8.6e-03	1.2e-02	7.2e-04	2.5e-05	4.1e-04	1.6e-03	2.4e-03
Am-242m	3.7e-03	1.3e-04	2.1e-03	8.6e-03	1.2e-02	7.2e-04	2.5e-05	4.1e-04	1.6e-03	2.4e-03
Am-243	3.7e-03	1.3e-04	2.1e-03	8.7e-03	1.2e-02	7.2e-04	2.5e-05	4.1e-04	1.6e-03	2.4e-03
Cm-242	1.9e-04	7.3e-06	1.1e-04	4.3e-04	7.2e-04	3.8e-05	1.4e-06	2.1e-05	8.4e-05	1.4e-04
Cm-243	2.8e-03	9.8e-05	1.6e-03	6.1e-03	1.0e-02	5.5e-04	2.0e-05	3.0e-04	1.2e-03	2.0e-03
Cm-244	2.2e-03	7.8e-05	1.3e-03	4.9e-03	8.1e-03	4.4e-04	1.6e-05	2.4e-04	9.5e-04	1.6e-03
Cm-245	3.9e-03	1.4e-04	2.2e-03	8.6e-03	1.4e-02	7.7e-04	2.6e-05	4.3e-04	1.7e-03	2.8e-03
Cm-246	3.9e-03	1.4e-04	2.2e-03	8.6e-03	1.4e-02	7.7e-04	2.6e-05	4.3e-04	1.7e-03	2.8e-03
Cm-247	3.5e-03	1.2e-04	2.0e-03	7.8e-03	1.3e-02	6.9e-04	2.6e-05	3.9e-04	1.5e-03	2.5e-03
Cm-248	1.4e-02	5.1e-04	8.2e-03	3.2e-02	5.2e-02	2.8e-03	1.0e-04	1.6e-03	6.1e-03	1.0e-02
Bk-249	1.8e-05	7.1e-07	1.0e-05	4.3e-05	6.6e-05	3.6e-06	1.4e-07	2.0e-06	8.3e-06	1.2e-05
Cf-248	4.9e-04	1.8e-05	2.7e-04	1.1e-03	1.7e-03	9.6e-05	3.4e-06	5.3e-05	2.2e-04	3.4e-04
Cf-249	6.4e-03	2.4e-04	3.5e-03	1.5e-02	2.3e-02	1.3e-03	4.4e-05	7.0e-04	3.0e-03	4.5e-03
Cf-250	2.9e-03	1.1e-04	1.7e-03	6.9e-03	1.1e-02	5.8e-04	2.0e-05	3.2e-04	1.4e-03	2.0e-03
Cf-251	6.6e-03	2.4e-04	3.7e-03	1.6e-02	2.4e-02	1.3e-03	4.5e-05	7.2e-04	3.1e-03	4.6e-03
Cf-252	1.6e-03	5.9e-05	9.0e-04	3.8e-03	5.8e-03	3.2e-04	1.1e-05	1.7e-04	7.4e-04	1.1e-03
Cf-254	4.9e-03	1.8e-04	2.7e-03	1.2e-02	1.7e-02	9.7e-04	3.6e-05	5.2e-04	2.2e-03	3.4e-03
Es-254	4.8e-04	1.9e-05	2.6e-04	1.1e-03	1.7e-03	9.4e-05	3.7e-06	5.2e-05	2.0e-04	3.4e-04

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.48 Normalized effective doses from all pathways: Metal product–driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	7.3e-07	2.4e-08	1.4e-07	1.7e-06	4.0e-06	1.4e-07	4.9e-09	2.7e-08	3.4e-07	8.0e-07
Na-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	9.5e-05	2.4e-06	1.9e-05	1.8e-04	3.8e-04	1.9e-05	4.7e-07	3.7e-06	3.4e-05	7.5e-05
S-35	6.2e-06	4.1e-09	1.8e-06	1.4e-07	3.1e-07	1.2e-06	8.3e-10	3.5e-09	2.7e-06	6.0e-06
Cl-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
K-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sc-46	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	4.4e-03	1.6e-04	8.1e-04	9.1e-03	2.2e-02	8.6e-04	3.3e-05	1.6e-04	1.8e-03	4.4e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.9e-01	1.9e-03	1.1e-02	7.1e-01	1.9e+00	5.6e-02	3.8e-04	2.3e-03	1.4e-01	3.7e-01
Fe-55	2.2e-11	1.1e-12	5.9e-12	5.2e-11	1.1e-10	4.4e-12	2.2e-13	1.2e-12	1.0e-11	2.3e-11
Fe-59	3.2e-01	1.8e-02	8.1e-02	7.0e-01	1.6e+00	6.3e-02	3.6e-03	1.6e-02	1.4e-01	3.2e-01
Co-58	1.3e+00	7.0e-02	3.3e-01	2.8e+00	6.3e+00	2.5e-01	1.4e-02	6.5e-02	5.6e-01	1.3e+00
Co-57	1.5e-02	8.0e-04	4.1e-03	3.5e-02	7.9e-02	3.0e-03	1.6e-04	8.1e-04	7.0e-03	1.5e-02
Co-58	3.3e-01	1.8e-02	8.6e-02	7.3e-01	1.6e+00	6.4e-02	3.6e-03	1.7e-02	1.4e-01	3.3e-01
Co-60	1.3e+00	6.6e-02	3.5e-01	3.0e+00	6.6e+00	2.6e-01	1.3e-02	6.9e-02	6.0e-01	1.3e+00
Ni-59	7.9e-06	4.0e-07	2.1e-06	1.8e-05	4.0e-05	1.6e-06	7.8e-08	4.1e-07	3.6e-06	7.9e-06
Ni-63	2.5e-09	1.3e-10	6.7e-10	5.7e-09	1.3e-08	4.9e-10	2.5e-11	1.3e-10	1.1e-09	2.5e-09
Zn-65	8.4e-03	6.7e-04	4.1e-03	1.9e-02	3.0e-02	1.7e-03	1.3e-04	8.3e-04	3.7e-03	5.9e-03
As-73	3.1e-05	1.9e-06	8.5e-06	7.0e-05	1.5e-04	6.2e-06	3.7e-07	1.7e-06	1.4e-05	3.1e-05
Se-75	8.4e-02	2.3e-04	1.1e-03	1.7e-01	4.3e-01	1.3e-02	4.6e-05	2.2e-04	3.3e-02	8.6e-02
Sr-85	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-89	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-90	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Y-91	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.6e-08	7.9e-10	4.2e-09	3.6e-08	8.0e-08	3.1e-09	1.6e-10	8.3e-10	7.2e-09	1.6e-08
Tc-97	3.7e-06	1.9e-09	9.9e-09	8.5e-08	1.9e-07	7.3e-09	3.7e-10	1.9e-09	1.7e-08	3.7e-08
Tc-97m	1.7e-05	9.7e-07	4.6e-06	3.9e-05	8.8e-05	3.4e-06	1.9e-07	9.2e-07	7.8e-06	1.8e-05
Tc-99	1.3e-05	6.7e-07	3.6e-06	3.0e-05	6.7e-05	2.6e-06	1.3e-07	7.0e-07	6.1e-06	1.3e-05
Ru-103	1.1e-01	8.5e-03	2.9e-02	2.5e-01	5.7e-01	2.2e-02	1.3e-03	5.8e-03	5.0e-02	1.1e-01
Ru-106	1.1e-01	5.6e-03	2.9e-02	2.5e-01	5.6e-01	2.1e-02	1.1e-03	5.7e-03	5.0e-02	1.1e-01
Ag-108m	7.8e-01	3.6e-02	1.9e-01	1.8e+00	4.1e+00	1.5e-01	7.1e-03	3.7e-02	3.6e-01	8.1e-01
Ag-110m	1.2e+00	5.7e-02	2.9e-01	2.8e+00	6.4e+00	2.4e-01	1.1e-02	5.6e-02	5.5e-01	1.2e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	8.9e-02	4.9e-03	2.4e-02	2.0e-01	4.6e-01	1.8e-02	9.7e-04	4.7e-03	4.0e-02	8.9e-02
Sb-124	1.5e-01	8.0e-03	8.5e-02	3.2e-01	4.8e-01	3.0e-02	1.2e-03	1.7e-02	6.2e-02	9.5e-02
Sb-125	5.2e-02	2.2e-03	3.0e-02	1.0e-01	1.6e-01	1.0e-02	4.5e-04	6.0e-03	2.0e-02	3.1e-02
Te-123m	8.6e-03	5.3e-05	2.5e-04	1.6e-02	4.3e-02	1.3e-03	1.0e-05	5.0e-05	3.3e-03	8.6e-03
Te-127m	5.3e-04	4.3e-06	2.0e-05	1.3e-03	3.5e-03	1.0e-04	8.4e-07	4.0e-06	2.7e-04	6.8e-04
I-125	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-129	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-131	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-134	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.48 Normalized effective doses from all pathways: Metal product-driver

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	5.6e-04	3.0e-05	1.5e-04	1.3e-03	2.8e-03	1.1e-04	6.0e-06	2.9e-05	2.5e-04	5.5e-04
W-185	2.7e-05	1.5e-06	7.0e-06	6.0e-05	1.3e-04	5.3e-06	3.0e-07	1.4e-06	1.2e-05	2.7e-05
Os-185	8.2e-03	5.7e-04	2.4e-03	1.8e-02	4.2e-02	1.6e-03	1.1e-04	4.7e-04	3.6e-03	8.1e-03
Ir-192	2.4e-01	1.3e-02	6.3e-02	5.4e-01	1.2e+00	4.7e-02	2.7e-03	1.3e-02	1.1e-01	2.4e-01
Tl-204	1.2e-05	5.7e-07	2.7e-06	2.7e-05	5.9e-05	2.3e-06	1.1e-07	5.3e-07	5.3e-06	1.2e-05
Pb-210	3.0e-05	1.5e-06	7.0e-06	7.0e-05	1.6e-04	6.0e-06	3.0e-07	1.4e-06	1.4e-05	3.1e-05
Bi-207	2.7e-02	1.7e-03	7.7e-03	6.1e-02	1.3e-01	5.3e-03	3.4e-04	1.5e-03	1.2e-02	2.6e-02
Po-210	4.5e-08	0.0e+00	2.4e-08	9.8e-08	1.5e-07	8.9e-09	0.0e+00	4.8e-09	1.9e-08	2.9e-08
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-236	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.49 Normalized effective doses from all pathways: Dust disposal-industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	5.4e-08	0.0e+00	5.4e-10	8.6e-08	1.8e-07	1.1e-08	0.0e+00	1.1e-10	1.7e-08	3.5e-08
Na-22	9.3e+00	2.2e-01	3.1e+00	2.0e+01	2.9e+01	1.8e+00	4.3e-02	6.2e-01	3.9e+00	5.7e+00
P-32	1.9e-04	2.1e-06	5.2e-05	4.2e-04	6.7e-04	3.7e-05	4.0e-07	1.0e-05	8.2e-05	1.3e-04
S-35	3.3e-07	5.9e-09	1.1e-07	7.4e-07	1.1e-06	6.6e-08	1.1e-09	2.2e-08	1.4e-07	2.2e-07
Cl-36	7.0e-04	9.8e-06	2.1e-04	1.6e-03	2.6e-03	1.4e-04	1.9e-06	4.1e-05	3.2e-04	5.1e-04
K-40	7.2e-01	1.7e-02	2.4e-01	1.5e+00	2.2e+00	1.4e-01	3.4e-03	4.8e-02	3.0e-01	4.3e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	2.7e-06	5.0e-08	9.2e-07	6.0e-06	9.1e-06	5.4e-07	9.8e-09	1.8e-07	1.2e-06	1.8e-06
Sc-46	5.4e-01	9.3e-03	1.8e-01	1.2e+00	1.8e+00	1.1e-01	1.8e-03	3.6e-02	2.3e-01	3.6e-01
Cr-51	1.4e-03	5.0e-06	3.3e-04	3.5e-03	5.5e-03	2.7e-04	9.8e-07	6.6e-05	6.9e-04	1.1e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e-01	4.0e-04	2.7e-02	3.2e-01	5.2e-01	2.3e-02	7.9e-05	5.2e-03	6.2e-02	1.0e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	4.8e-02	3.0e-04	1.3e-02	1.1e-01	1.7e-01	9.5e-03	5.9e-05	2.6e-03	2.2e-02	3.4e-02
Co-56	1.7e-01	1.5e-03	5.3e-02	4.5e-01	6.7e-01	3.4e-02	2.9e-04	1.0e-02	8.8e-02	1.3e-01
Co-57	4.3e-03	3.8e-05	1.3e-03	1.1e-02	1.7e-02	8.4e-04	7.2e-06	2.6e-04	2.1e-03	3.3e-03
Co-58	4.2e-02	3.6e-04	1.3e-02	1.1e-01	1.6e-01	8.3e-03	6.9e-05	2.5e-03	2.1e-02	3.3e-02
Co-60	1.6e-01	1.4e-03	4.8e-02	3.9e-01	6.0e-01	3.1e-02	2.7e-04	9.4e-03	7.6e-02	1.2e-01
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	3.6e+00	7.2e-02	1.3e+00	7.9e+00	1.2e+01	7.0e-01	1.4e-02	2.5e-01	1.5e+00	2.3e+00
As-73	2.4e-03	4.6e-05	8.1e-04	5.1e-03	8.1e-03	4.8e-04	9.1e-06	1.6e-04	1.0e-03	1.6e-03
Se-75	9.7e-01	3.4e-03	2.1e-01	2.8e+00	4.6e+00	1.9e-01	6.6e-04	4.1e-02	5.5e-01	9.3e-01
Sr-85	1.2e-01	2.0e-03	3.8e-02	2.5e-01	3.8e-01	2.3e-02	3.9e-04	7.6e-03	4.9e-02	7.5e-02
Sr-89	5.8e-04	9.7e-06	1.9e-04	1.3e-03	1.9e-03	1.1e-04	1.9e-06	3.7e-05	2.5e-04	3.8e-04
Sr-90	2.4e-03	4.4e-05	8.0e-04	5.2e-03	7.8e-03	4.7e-04	8.6e-06	1.6e-04	1.0e-03	1.5e-03
Y-91	1.5e-03	2.7e-05	5.1e-04	3.3e-03	5.1e-03	2.9e-04	5.4e-06	1.0e-04	6.6e-04	1.0e-03
Zr-93	1.6e-08	2.7e-10	4.8e-09	3.3e-08	5.2e-08	3.1e-09	5.2e-11	9.5e-10	6.5e-09	1.0e-08
Zr-95	2.7e-01	4.7e-03	9.1e-02	5.8e-01	9.2e-01	5.4e-02	9.2e-04	1.8e-02	1.2e-01	1.8e-01
Nb-93m	4.2e-06	8.0e-08	1.5e-06	9.5e-06	1.4e-05	8.3e-07	1.6e-08	2.9e-07	1.9e-06	2.8e-06
Nb-94	5.3e-01	9.9e-03	1.8e-01	1.2e+00	1.8e+00	1.0e-01	2.0e-03	3.6e-02	2.3e-01	3.5e-01
Nb-95	1.4e-01	2.3e-03	4.5e-02	3.1e-01	4.7e-01	2.7e-02	4.5e-04	9.0e-03	6.1e-02	9.4e-02
Mo-93	4.8e-06	3.3e-08	1.3e-06	1.1e-05	1.7e-05	9.4e-07	6.4e-09	2.6e-07	2.2e-06	3.3e-06
Tc-97	6.3e-06	5.1e-08	1.8e-06	1.4e-05	2.2e-05	1.2e-06	1.0e-08	3.5e-07	2.8e-06	4.5e-06
Tc-97m	1.3e-05	1.0e-07	3.7e-06	3.0e-05	4.8e-05	2.6e-06	2.1e-08	7.3e-07	6.0e-06	9.5e-06
Tc-99	1.2e-06	9.8e-09	3.4e-07	2.7e-06	4.3e-06	2.4e-07	2.0e-09	6.7e-08	5.4e-07	8.6e-07
Ru-103	1.6e-02	1.0e-04	4.6e-03	3.8e-02	5.9e-02	3.2e-03	2.0e-05	9.0e-04	7.4e-03	1.2e-02
Ru-106	1.3e-02	9.2e-05	3.7e-03	2.9e-02	4.5e-02	2.5e-03	1.8e-05	7.3e-04	5.7e-03	8.9e-03
Ag-108m	7.4e-01	7.6e-04	1.1e-01	2.2e+00	3.5e+00	1.5e-01	1.5e-04	2.3e-02	4.3e-01	7.0e-01
Ag-110m	1.2e+00	1.2e-03	1.9e-01	3.6e+00	5.9e+00	2.4e-01	2.5e-04	3.7e-02	7.1e-01	1.2e+00
Cd-109	2.5e-02	4.9e-04	8.9e-03	5.6e-02	8.5e-02	5.0e-03	9.6e-05	1.8e-03	1.1e-02	1.7e-02
Sn-113	1.7e-02	3.6e-04	5.5e-03	3.5e-02	5.5e-02	3.4e-03	7.1e-05	1.1e-03	7.0e-03	1.1e-02
Sb-124	4.8e+00	7.3e-02	8.8e-01	7.6e+00	1.5e+01	9.3e-01	1.5e-02	1.7e-01	1.5e+00	2.9e+00
Sb-125	1.4e+00	2.2e-02	2.6e-01	2.3e+00	4.5e+00	2.8e-01	4.4e-03	5.0e-02	4.6e-01	8.8e-01
Te-123m	4.4e-01	6.3e-03	1.5e-01	1.0e+00	1.7e+00	8.7e-02	1.2e-03	3.0e-02	2.0e-01	3.3e-01
Te-127m	2.3e-02	3.3e-04	7.8e-03	5.3e-02	8.7e-02	4.5e-03	6.4e-05	1.5e-03	1.0e-02	1.7e-02
I-125	2.2e-03	3.1e-05	6.9e-04	5.2e-03	8.3e-03	4.4e-04	6.1e-06	1.4e-04	1.0e-03	1.6e-03
I-129	2.6e-03	3.9e-05	8.1e-04	5.9e-03	9.6e-03	5.1e-04	7.6e-06	1.6e-04	1.2e-03	1.9e-03
I-131	5.6e-02	1.9e-04	1.0e-02	1.2e-01	2.2e-01	1.1e-02	3.7e-05	2.0e-03	2.4e-02	4.3e-02
Cs-134	8.8e+00	1.5e-01	3.2e+00	2.0e+01	3.2e+01	1.7e+00	2.9e-02	6.2e-01	3.9e+00	6.2e+00
Cs-135	3.3e-05	5.5e-07	1.2e-05	7.4e-05	1.2e-04	6.5e-06	1.1e-07	2.3e-06	1.5e-05	2.3e-05
Cs-137	3.3e+00	5.4e-02	1.2e+00	7.3e+00	1.2e+01	6.4e-01	1.1e-02	2.3e-01	1.4e+00	2.3e+00
Ba-133	1.0e-01	1.9e-03	3.6e-02	2.3e-01	3.5e-01	2.1e-02	3.8e-04	7.1e-03	4.6e-02	6.9e-02
Ce-139	2.8e-02	5.2e-04	9.7e-03	6.4e-02	9.9e-02	5.5e-03	1.0e-04	1.9e-03	1.3e-02	2.0e-02
Ce-141	8.6e-03	1.3e-04	2.8e-03	1.9e-02	3.0e-02	1.7e-03	2.7e-05	5.6e-04	3.8e-03	6.0e-03
Ce-144	1.7e-02	3.2e-04	5.9e-03	3.9e-02	6.0e-02	3.4e-03	6.3e-05	1.2e-03	7.7e-03	1.2e-02
Pm-147	2.4e-06	4.6e-08	8.2e-07	5.5e-06	8.2e-06	4.8e-07	9.1e-09	1.6e-07	1.1e-06	1.6e-06

Table F2.49 Normalized effective doses from all pathways: Dust disposal-Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	3.9e-08	7.3e-10	1.3e-08	8.6e-08	1.3e-07	7.7e-09	1.4e-10	2.6e-09	1.7e-08	2.6e-08
Eu-152	3.9e-01	7.1e-03	1.3e-01	8.4e-01	1.3e+00	7.7e-02	1.4e-03	2.5e-02	1.6e-01	2.5e-01
Eu-154	4.3e-01	7.8e-03	1.4e-01	9.3e-01	1.4e+00	8.4e-02	1.5e-03	2.8e-02	1.8e-01	2.8e-01
Eu-155	9.5e-03	1.7e-04	3.1e-03	2.1e-02	3.1e-02	1.9e-03	3.4e-05	6.2e-04	4.0e-03	6.1e-03
Gd-153	1.1e-02	2.1e-04	3.8e-03	2.5e-02	3.8e-02	2.2e-03	4.1e-05	7.5e-04	4.9e-03	7.4e-03
Tb-160	2.8e-01	4.9e-03	9.5e-02	6.2e-01	9.7e-01	5.5e-02	9.5e-04	1.9e-02	1.2e-01	1.9e-01
Tm-170	7.0e-04	1.3e-05	2.4e-04	1.5e-03	2.4e-03	1.4e-04	2.5e-06	4.7e-05	3.0e-04	4.7e-04
Tm-171	5.4e-05	9.9e-07	1.8e-05	1.2e-04	1.8e-04	1.1e-05	1.9e-07	3.6e-06	2.3e-05	3.6e-05
Ta-182	3.7e-01	6.5e-03	1.2e-01	7.8e-01	1.2e+00	7.3e-02	1.3e-03	2.4e-02	1.5e-01	2.3e-01
W-181	6.2e-04	4.6e-06	1.7e-04	1.4e-03	2.2e-03	1.2e-04	8.9e-07	3.4e-05	2.8e-04	4.2e-04
W-185	3.3e-06	2.4e-08	8.9e-07	7.6e-06	1.2e-05	6.4e-07	4.6e-09	1.7e-07	1.5e-06	2.2e-06
Os-185	3.5e+00	6.5e-02	1.2e+00	7.7e+00	1.2e+01	6.9e-01	1.3e-02	2.4e-01	1.5e+00	2.3e+00
Ir-192	3.4e-02	2.3e-04	1.0e-02	8.5e-02	1.3e-01	6.7e-03	4.8e-05	2.0e-03	1.6e-02	2.6e-02
Tl-204	4.3e-03	8.5e-05	1.5e-03	9.5e-03	1.4e-02	8.4e-04	1.6e-05	3.0e-04	1.9e-03	2.9e-03
Pb-210	8.4e-03	1.6e-04	3.0e-03	1.8e-02	2.8e-02	1.6e-03	3.2e-05	5.9e-04	3.6e-03	5.6e-03
Bi-207	1.0e+01	2.0e-01	3.5e+00	2.2e+01	3.3e+01	2.0e+00	3.8e-02	7.0e-01	4.3e+00	6.6e+00
Po-210	4.8e-05	9.4e-07	1.7e-05	1.1e-04	1.8e-04	9.5e-06	1.8e-07	3.4e-06	2.1e-05	3.1e-05
Ra-226	6.4e-01	1.1e-02	2.1e-01	1.3e+00	2.1e+00	1.3e-01	2.2e-03	4.1e-02	2.6e-01	4.1e-01
Ra-228	3.6e-01	6.3e-03	1.2e-01	7.4e-01	1.1e+00	7.0e-02	1.2e-03	2.3e-02	1.5e-01	2.3e-01
Ac-227	1.0e-01	2.0e-03	3.6e-02	2.4e-01	3.6e-01	2.1e-02	4.0e-04	7.2e-03	4.7e-02	7.0e-02
Th-228	5.5e-01	1.0e-02	1.9e-01	1.2e+00	1.8e+00	1.1e-01	2.0e-03	3.7e-02	2.3e-01	3.6e-01
Th-229	8.6e-02	1.6e-03	2.9e-02	1.8e-01	2.9e-01	1.7e-02	3.1e-04	5.8e-03	3.6e-02	5.7e-02
Th-230	8.6e-05	1.6e-06	2.9e-05	1.8e-04	2.8e-04	1.7e-05	3.1e-07	5.7e-06	3.6e-05	5.6e-05
Th-232	3.6e-03	6.4e-05	1.1e-03	7.7e-03	1.3e-02	7.1e-04	1.3e-05	2.3e-04	1.5e-03	2.4e-03
Pa-231	1.0e-02	2.0e-04	3.6e-03	2.3e-02	3.5e-02	2.0e-03	4.0e-05	7.1e-04	4.6e-03	6.8e-03
U-232	1.7e-02	3.1e-04	5.5e-03	3.8e-02	6.2e-02	3.4e-03	6.0e-05	1.1e-03	7.5e-03	1.2e-02
U-233	7.4e-05	1.4e-06	2.5e-05	1.6e-04	2.5e-04	1.5e-05	2.7e-07	5.0e-06	3.2e-05	5.0e-05
U-234	2.0e-05	3.7e-07	6.7e-06	4.4e-05	6.9e-05	3.9e-06	7.2e-08	1.3e-06	8.7e-06	1.3e-05
U-235	4.0e-02	7.4e-04	1.3e-02	8.9e-02	1.4e-01	7.9e-03	1.4e-04	2.7e-03	1.8e-02	2.7e-02
U-236	1.0e-05	1.9e-07	3.5e-06	2.3e-05	3.6e-05	2.0e-06	3.7e-08	6.9e-07	4.5e-06	6.9e-06
U-238	8.0e-03	1.5e-04	2.7e-03	1.8e-02	2.7e-02	1.6e-03	2.9e-05	5.4e-04	3.5e-03	5.4e-03
Np-237	5.9e-02	1.1e-03	2.0e-02	1.3e-01	2.0e-01	1.2e-02	2.1e-04	4.0e-03	2.5e-02	3.9e-02
Pu-236	1.9e-05	3.7e-07	6.1e-06	4.1e-05	6.6e-05	3.8e-06	7.2e-08	1.2e-06	8.1e-06	1.3e-05
Pu-238	6.8e-06	1.3e-07	2.3e-06	1.5e-05	2.3e-05	1.3e-06	2.5e-08	4.6e-07	2.9e-06	4.5e-06
Pu-239	1.5e-05	2.9e-07	5.2e-06	3.4e-05	5.2e-05	3.0e-06	5.6e-08	1.0e-06	6.6e-06	1.0e-05
Pu-240	6.6e-06	1.2e-07	2.2e-06	1.4e-05	2.2e-05	1.3e-06	2.4e-08	4.4e-07	2.8e-06	4.4e-06
Pu-241	6.1e-07	1.2e-08	2.0e-07	1.3e-06	2.1e-06	1.2e-07	2.3e-09	4.0e-08	2.6e-07	4.1e-07
Pu-242	5.8e-06	1.1e-07	1.9e-06	1.3e-05	2.0e-05	1.1e-06	2.1e-08	3.9e-07	2.5e-06	3.8e-06
Pu-244	1.1e-01	2.1e-03	3.7e-02	2.4e-01	3.8e-01	2.2e-02	4.1e-04	7.5e-03	4.8e-02	7.4e-02
Am-241	2.2e-03	3.9e-05	7.3e-04	4.6e-03	7.4e-03	4.3e-04	7.6e-06	1.4e-04	9.4e-04	1.5e-03
Am-242m	3.6e-03	6.4e-05	1.2e-03	7.9e-03	1.2e-02	7.1e-04	1.3e-05	2.4e-04	1.6e-03	2.4e-03
Am-243	4.8e-02	8.5e-04	1.6e-02	1.0e-01	1.6e-01	9.4e-03	1.7e-04	3.2e-03	2.1e-02	3.2e-02
Cm-242	6.5e-06	1.1e-07	2.2e-06	1.5e-05	2.2e-05	1.3e-06	2.3e-08	4.4e-07	2.9e-06	4.4e-06
Cm-243	3.1e-02	5.7e-04	1.0e-02	6.9e-02	1.0e-01	6.0e-03	1.1e-04	2.1e-03	1.4e-02	2.0e-02
Cm-244	5.1e-06	9.5e-08	1.8e-06	1.2e-05	1.8e-05	1.0e-06	1.9e-08	3.5e-07	2.3e-06	3.4e-06
Cm-245	1.8e-02	3.2e-04	6.0e-03	4.0e-02	6.0e-02	3.5e-03	6.4e-05	1.2e-03	7.9e-03	1.2e-02
Cm-246	4.8e-06	8.8e-08	1.6e-06	1.1e-05	1.6e-05	9.4e-07	1.7e-08	3.3e-07	2.1e-06	3.2e-06
Cm-247	9.9e-02	1.8e-03	3.4e-02	2.2e-01	3.4e-01	2.0e-02	3.6e-04	6.8e-03	4.4e-02	6.6e-02
Cm-248	3.6e-06	6.6e-08	1.2e-06	8.2e-06	1.2e-05	7.1e-07	1.3e-08	2.5e-07	1.6e-06	2.4e-06
Bk-249	1.6e-05	3.2e-07	5.3e-06	3.6e-05	6.0e-05	3.2e-06	6.2e-08	1.1e-06	7.1e-06	1.2e-05
Cf-248	4.8e-06	8.8e-08	1.6e-06	1.1e-05	1.6e-05	9.4e-07	1.7e-08	3.2e-07	2.1e-06	3.2e-06
Cf-249	9.9e-02	1.9e-03	3.4e-02	2.2e-01	3.3e-01	2.0e-02	3.7e-04	6.8e-03	4.3e-02	6.6e-02
Cf-250	4.8e-06	9.0e-08	1.6e-06	1.0e-05	1.6e-05	9.4e-07	1.8e-08	3.3e-07	2.1e-06	3.2e-06
Cf-251	2.8e-02	5.2e-04	9.6e-03	6.1e-02	9.3e-02	5.4e-03	1.0e-04	1.9e-03	1.2e-02	1.8e-02
Cf-252	7.7e-06	1.5e-07	2.6e-06	1.7e-05	2.6e-05	1.5e-06	2.8e-08	5.2e-07	3.3e-06	5.1e-06
Cf-254	1.1e-08	1.9e-10	3.7e-09	2.4e-08	3.7e-08	2.1e-09	3.7e-11	7.3e-10	4.8e-09	7.3e-09
Es-254	2.8e-01	5.2e-03	9.6e-02	6.3e-01	9.4e-01	5.5e-02	1.0e-03	1.9e-02	1.2e-01	1.9e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.50 Normalized effective doses from all pathways: Dust disposal-municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.2e-08	0.0e+00	6.1e-11	2.2e-08	5.2e-08	2.4e-09	0.0e+00	1.2e-11	4.5e-09	1.0e-08
Na-22	2.8e+00	2.0e-02	8.5e-01	7.3e+00	1.1e+01	5.6e-01	4.1e-03	1.7e-01	1.4e+00	2.2e+00
P-32	2.8e-05	1.1e-08	7.0e-06	5.5e-05	9.3e-05	5.6e-06	2.0e-09	1.4e-06	1.1e-05	1.8e-05
S-35	6.9e-08	5.6e-10	2.7e-08	1.5e-07	2.3e-07	1.4e-08	1.1e-10	5.3e-09	3.0e-08	4.5e-08
Cl-36	2.5e-04	1.0e-06	5.3e-05	8.4e-04	1.2e-03	4.9e-05	2.0e-07	1.1e-05	1.3e-04	2.2e-04
K-40	2.4e-01	1.6e-03	6.5e-02	8.2e-01	1.0e+00	4.7e-02	3.3e-04	1.3e-02	1.2e-01	2.0e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	8.3e-07	4.9e-09	2.4e-07	1.5e-06	2.2e-06	1.2e-07	9.8e-10	4.8e-08	2.9e-07	4.3e-07
Sc-46	1.1e-01	9.1e-04	4.4e-02	2.3e-01	3.4e-01	2.1e-02	1.8e-04	8.6e-03	4.5e-02	6.7e-02
Cr-51	1.6e-04	3.0e-07	4.9e-05	4.2e-04	6.0e-04	3.2e-05	6.0e-08	9.5e-06	8.2e-05	1.2e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	3.3e-02	3.7e-05	6.3e-03	1.1e-01	1.5e-01	6.6e-03	7.4e-06	1.3e-03	2.2e-02	3.1e-02
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	7.8e-03	2.8e-05	2.8e-03	1.7e-02	2.6e-02	1.5e-03	5.5e-06	5.6e-04	3.4e-03	5.1e-03
Co-56	3.5e-02	1.5e-04	1.3e-02	8.0e-02	1.2e-01	7.0e-03	3.0e-05	2.6e-03	1.6e-02	2.4e-02
Co-57	1.2e-03	3.8e-06	3.5e-04	3.3e-03	4.9e-03	2.4e-04	7.8e-07	7.0e-05	6.5e-04	9.4e-04
Co-58	8.3e-03	3.5e-05	3.1e-03	1.9e-02	2.8e-02	1.6e-03	7.1e-06	6.2e-04	3.7e-03	5.4e-03
Co-60	5.6e-02	1.4e-04	1.3e-02	1.6e-01	2.6e-01	1.1e-02	2.9e-05	2.5e-03	3.2e-02	5.2e-02
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	9.2e-01	6.9e-03	3.3e-01	2.3e+00	3.2e+00	1.8e-01	1.4e-03	6.5e-02	4.5e-01	6.3e-01
As-73	5.0e-04	4.5e-06	1.9e-04	1.0e-03	1.6e-03	9.9e-05	9.0e-07	3.8e-05	2.0e-04	3.1e-04
Se-75	1.9e-01	3.2e-04	3.4e-02	6.1e-01	8.4e-01	3.8e-02	6.5e-05	6.8e-03	1.2e-01	1.7e-01
Sr-85	2.2e-02	1.8e-04	8.8e-03	4.6e-02	6.8e-02	4.3e-03	3.6e-05	1.7e-03	9.0e-03	1.3e-02
Sr-89	1.0e-04	7.8e-07	4.1e-05	2.1e-04	3.2e-04	2.0e-05	1.6e-07	8.1e-06	4.1e-05	6.3e-05
Sr-90	8.1e-04	4.2e-06	2.1e-04	2.2e-03	3.6e-03	1.6e-04	8.3e-07	4.1e-05	4.4e-04	7.2e-04
Y-91	2.8e-04	2.4e-06	1.1e-04	5.9e-04	9.1e-04	5.6e-05	4.9e-07	2.2e-05	1.2e-04	1.8e-04
Zr-93	3.0e-08	4.2e-12	1.1e-09	4.6e-08	1.3e-07	6.0e-09	8.3e-13	2.2e-10	9.1e-09	2.5e-08
Zr-95	5.7e-02	4.5e-04	2.1e-02	1.3e-01	2.0e-01	1.1e-02	8.9e-05	4.1e-03	2.6e-02	3.9e-02
Nb-93m	1.4e-06	7.9e-09	3.8e-07	3.9e-06	6.4e-06	2.9e-07	1.6e-09	7.4e-08	7.8e-07	1.3e-06
Nb-94	1.8e-01	9.8e-04	4.7e-02	4.9e-01	8.1e-01	3.6e-02	1.9e-04	9.3e-03	9.9e-02	1.6e-01
Nb-95	2.3e-02	1.4e-04	8.7e-03	4.6e-02	7.5e-02	4.6e-03	2.7e-05	1.7e-03	9.0e-03	1.5e-02
Mo-93	1.7e-06	4.1e-09	3.5e-07	4.5e-06	7.7e-06	3.3e-07	8.3e-10	6.8e-08	8.9e-07	1.6e-06
Tc-97	2.2e-06	8.1e-09	4.6e-07	8.1e-06	1.1e-05	4.4e-07	1.2e-09	9.2e-08	1.2e-06	2.1e-06
Tc-97m	2.6e-06	1.2e-08	9.3e-07	5.9e-06	8.8e-06	5.1e-07	2.4e-09	1.9e-07	1.2e-06	1.7e-06
Tc-99	4.3e-07	1.2e-09	8.9e-08	1.2e-06	2.0e-06	8.5e-08	2.3e-10	1.8e-08	2.4e-07	4.0e-07
Ru-103	2.6e-03	8.7e-06	8.9e-04	5.4e-03	8.0e-03	5.1e-04	1.7e-06	1.8e-04	1.1e-03	1.6e-03
Ru-106	3.6e-03	1.1e-05	9.5e-04	1.0e-02	1.5e-02	7.1e-04	2.0e-06	1.9e-04	2.0e-03	2.9e-03
Ag-108m	3.2e-01	7.9e-05	1.7e-02	9.3e-01	1.7e+00	6.3e-02	1.5e-05	3.4e-03	1.9e-01	3.4e-01
Ag-110m	3.3e-01	1.2e-04	2.9e-02	1.1e+00	1.7e+00	6.5e-02	2.4e-05	5.7e-03	2.2e-01	3.3e-01
Cd-109	7.3e-03	4.7e-05	2.3e-03	2.0e-02	2.9e-02	1.4e-03	9.5e-06	4.5e-04	4.0e-03	5.7e-03
Sn-113	3.8e-03	3.4e-05	1.4e-03	7.8e-03	1.3e-02	7.5e-04	6.8e-06	2.7e-04	1.5e-03	2.5e-03
Sb-124	1.1e+00	6.1e-03	1.6e-01	2.1e+00	4.3e+00	2.1e-01	1.2e-03	3.2e-02	4.3e-01	8.7e-01
Sb-125	3.6e-01	1.7e-03	7.1e-02	7.2e-01	1.4e+00	7.2e-02	3.3e-04	1.3e-02	1.5e-01	2.7e-01
Te-123m	9.4e-02	6.2e-04	3.9e-02	2.3e-01	3.2e-01	1.9e-02	1.2e-04	7.7e-03	4.6e-02	6.4e-02
Te-127m	4.7e-03	3.2e-05	2.0e-03	1.1e-02	1.6e-02	9.4e-04	6.5e-06	4.0e-04	2.3e-03	3.2e-03
I-125	4.3e-04	2.9e-06	1.5e-04	9.2e-04	1.5e-03	8.4e-05	5.8e-07	3.0e-05	1.8e-04	2.9e-04
I-129	9.2e-04	4.0e-06	2.1e-04	2.5e-03	4.2e-03	1.8e-04	7.8e-07	4.2e-05	5.0e-04	8.1e-04
I-131	8.4e-03	2.1e-09	1.5e-03	1.9e-02	3.0e-02	1.6e-03	4.3e-10	2.9e-04	3.7e-03	5.9e-03
Cs-134	2.8e+00	1.4e-02	7.8e-01	8.1e+00	1.2e+01	5.5e-01	2.9e-03	1.6e-01	1.6e+00	2.3e+00
Cs-135	1.2e-05	5.4e-08	2.9e-06	3.3e-05	5.3e-05	2.4e-06	1.1e-08	5.8e-07	6.6e-06	1.0e-05
Cs-137	1.2e+00	5.3e-03	2.9e-01	3.3e+00	5.2e+00	2.3e-01	1.1e-03	5.8e-02	6.5e-01	1.0e+00
Ba-133	3.5e-02	1.9e-04	9.1e-03	9.7e-02	1.5e-01	7.0e-03	3.8e-05	1.8e-03	1.9e-02	3.0e-02
Ce-139	6.5e-03	5.1e-05	2.5e-03	1.5e-02	2.2e-02	1.3e-03	1.0e-05	5.0e-04	2.9e-03	4.4e-03
Ce-141	1.4e-03	7.2e-06	5.4e-04	2.8e-03	4.4e-03	2.8e-04	1.5e-06	1.1e-04	5.5e-04	9.0e-04
Ce-144	4.7e-03	3.1e-05	1.6e-03	1.2e-02	1.7e-02	9.2e-04	6.2e-06	3.1e-04	2.4e-03	3.5e-03
Pm-147	7.7e-07	4.6e-09	2.2e-07	2.1e-06	3.3e-06	1.5e-07	9.0e-10	4.3e-08	4.2e-07	6.5e-07

Table F2.50 Normalized effective doses from all pathways: Dust disposal-municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.4e-08	7.0e-11	3.4e-09	3.8e-08	6.1e-08	2.7e-09	1.4e-11	6.7e-10	7.4e-09	1.2e-08
Eu-152	1.3e-01	6.9e-04	3.3e-02	3.5e-01	5.7e-01	2.6e-02	1.4e-04	6.6e-03	6.9e-02	1.1e-01
Eu-154	1.4e-01	7.6e-04	3.7e-02	3.8e-01	6.1e-01	2.8e-02	1.5e-04	7.2e-03	7.5e-02	1.2e-01
Eu-155	3.1e-03	1.7e-05	8.2e-04	8.2e-03	1.3e-02	6.1e-04	3.4e-06	1.6e-04	1.6e-03	2.7e-03
Gd-153	2.9e-03	2.0e-05	1.0e-03	7.2e-03	1.0e-02	5.7e-04	4.0e-06	2.0e-04	1.4e-03	2.0e-03
Tb-160	5.5e-02	4.7e-04	2.2e-02	1.1e-01	1.7e-01	1.1e-02	9.4e-05	4.4e-03	2.2e-02	3.5e-02
Tm-170	1.5e-04	1.2e-06	6.0e-05	3.5e-04	5.1e-04	3.0e-05	2.4e-07	1.2e-05	6.9e-05	1.0e-04
Tm-171	1.6e-05	9.6e-08	4.6e-06	4.5e-05	7.1e-05	3.2e-06	1.9e-08	9.1e-07	8.8e-06	1.4e-05
Ta-182	7.8e-02	6.3e-04	3.1e-02	1.8e-01	2.5e-01	1.5e-02	1.3e-04	6.1e-03	3.5e-02	5.0e-02
W-181	1.3e-04	4.6e-07	4.4e-05	3.1e-04	4.6e-04	2.5e-05	9.3e-08	8.7e-06	6.2e-05	8.9e-05
W-185	5.8e-07	2.3e-09	2.1e-07	1.4e-06	2.0e-06	1.1e-07	4.7e-10	4.2e-08	2.6e-07	3.9e-07
Os-185	7.2e-01	6.5e-03	3.0e-01	1.6e+00	2.5e+00	1.4e-01	1.3e-03	6.0e-02	3.1e-01	4.5e-01
Ir-192	6.6e-03	3.1e-05	2.5e-03	1.4e-02	2.1e-02	1.3e-03	6.2e-06	4.9e-04	2.8e-03	4.2e-03
Tl-204	1.4e-03	8.0e-06	3.9e-04	3.8e-03	6.0e-03	2.8e-04	1.6e-06	7.6e-05	7.6e-04	1.2e-03
Pb-210	2.9e-03	1.6e-05	7.6e-04	7.9e-03	1.3e-02	5.7e-04	3.2e-06	1.5e-04	1.6e-03	2.5e-03
Bi-207	3.4e+00	1.9e-02	9.0e-01	9.3e+00	1.5e+01	6.8e-01	3.8e-03	1.8e-01	1.9e+00	2.9e+00
Po-210	1.1e-05	9.2e-08	4.4e-06	2.4e-05	3.5e-05	2.2e-06	1.8e-08	8.7e-07	4.8e-06	7.1e-06
Ra-226	2.1e-01	1.1e-03	5.4e-02	5.6e-01	9.4e-01	4.2e-02	2.3e-04	1.1e-02	1.1e-01	1.9e-01
Ra-228	1.3e-01	6.3e-04	3.0e-02	3.5e-01	6.2e-01	2.7e-02	1.3e-04	6.0e-03	7.0e-02	1.2e-01
Ac-227	3.7e-02	2.0e-04	9.5e-03	9.6e-02	1.6e-01	7.2e-03	4.1e-05	1.9e-03	1.9e-02	3.2e-02
Th-228	1.6e-01	1.0e-03	4.8e-02	4.5e-01	6.8e-01	3.3e-02	2.0e-04	9.6e-03	9.0e-02	1.4e-01
Th-229	2.9e-02	1.6e-04	7.5e-03	7.9e-02	1.3e-01	5.8e-03	3.2e-05	1.5e-03	1.6e-02	2.6e-02
Th-230	6.7e-05	1.6e-07	7.3e-06	1.3e-04	3.2e-04	1.3e-05	3.2e-08	1.4e-06	2.6e-05	6.2e-05
Th-232	8.3e-03	1.1e-06	2.6e-04	1.1e-02	3.5e-02	1.6e-03	2.1e-07	5.2e-05	2.3e-03	7.0e-03
Pa-231	4.1e-03	1.9e-05	9.3e-04	1.1e-02	1.9e-02	8.2e-04	3.7e-06	1.8e-04	2.1e-03	3.7e-03
U-232	2.9e-02	5.0e-06	1.3e-03	5.2e-02	1.4e-01	5.8e-03	1.0e-06	2.6e-04	1.0e-02	2.7e-02
U-233	2.7e-05	1.4e-07	6.6e-06	7.1e-05	1.2e-04	5.3e-06	2.8e-08	1.3e-06	1.4e-05	2.4e-05
U-234	6.9e-06	3.7e-08	1.8e-06	1.8e-05	3.0e-05	1.4e-06	7.5e-09	3.5e-07	3.7e-06	6.0e-06
U-235	1.4e-02	7.5e-05	3.6e-03	3.7e-02	6.1e-02	2.8e-03	1.5e-05	7.1e-04	7.4e-03	1.2e-02
U-236	3.6e-06	1.9e-08	9.3e-07	9.5e-06	1.6e-05	7.1e-07	3.9e-09	1.8e-07	1.9e-06	3.1e-06
U-238	2.8e-03	1.5e-05	7.2e-04	7.4e-03	1.2e-02	5.5e-04	3.0e-06	1.4e-04	1.5e-03	2.4e-03
Np-237	2.0e-02	1.1e-04	5.2e-03	5.4e-02	8.8e-02	4.0e-03	2.1e-05	1.0e-03	1.1e-02	1.7e-02
Pu-236	1.5e-04	3.6e-08	1.5e-06	9.0e-05	4.1e-04	3.0e-05	7.2e-09	3.0e-07	1.8e-05	8.3e-05
Pu-238	2.3e-06	1.3e-08	5.8e-07	6.1e-06	1.0e-05	4.6e-07	2.5e-09	1.2e-07	1.2e-06	2.0e-06
Pu-239	5.3e-06	2.9e-08	1.3e-06	1.4e-05	2.3e-05	1.0e-06	5.6e-09	2.6e-07	2.7e-06	4.6e-06
Pu-240	2.3e-06	1.2e-08	5.6e-07	5.9e-06	9.9e-06	4.5e-07	2.4e-09	1.1e-07	1.2e-06	2.0e-06
Pu-241	6.9e-07	1.1e-09	4.8e-08	1.2e-06	3.1e-06	1.4e-07	2.3e-10	9.7e-09	2.4e-07	6.1e-07
Pu-242	2.0e-06	1.1e-08	5.0e-07	5.2e-06	8.8e-06	3.9e-07	2.1e-09	9.9e-08	1.0e-06	1.7e-06
Pu-244	3.8e-02	2.1e-04	9.6e-03	1.0e-01	1.7e-01	7.5e-03	4.1e-05	1.9e-03	2.0e-02	3.3e-02
Am-241	7.6e-04	4.0e-06	1.9e-04	2.0e-03	3.3e-03	1.5e-04	8.1e-07	3.7e-05	4.1e-04	6.7e-04
Am-242m	1.3e-03	6.6e-06	3.1e-04	3.4e-03	5.4e-03	2.5e-04	1.3e-06	6.1e-05	6.7e-04	1.1e-03
Am-243	1.7e-02	8.8e-05	4.2e-03	4.5e-02	7.2e-02	3.3e-03	1.8e-05	8.1e-04	8.9e-03	1.5e-02
Cm-242	1.5e-06	1.1e-08	5.9e-07	3.5e-06	5.4e-06	3.0e-07	2.3e-09	1.2e-07	7.2e-07	1.0e-06
Cm-243	1.1e-02	5.6e-05	2.6e-03	2.9e-02	4.8e-02	2.1e-03	1.1e-05	5.4e-04	5.7e-03	9.5e-03
Cm-244	1.8e-06	9.3e-09	4.6e-07	4.8e-06	7.9e-06	3.5e-07	1.8e-09	9.1e-08	9.5e-07	1.6e-06
Cm-245	6.2e-03	3.2e-05	1.5e-03	1.7e-02	2.8e-02	1.2e-03	6.3e-06	3.1e-04	3.3e-03	5.5e-03
Cm-246	1.7e-06	8.7e-09	4.3e-07	4.5e-06	7.5e-06	3.3e-07	1.7e-09	8.4e-08	8.9e-07	1.5e-06
Cm-247	3.5e-02	1.8e-04	9.0e-03	9.4e-02	1.6e-01	6.9e-03	3.5e-05	1.7e-03	1.9e-02	3.1e-02
Cm-248	1.3e-06	6.5e-09	3.3e-07	3.4e-06	5.7e-06	2.5e-07	1.3e-09	6.3e-08	6.8e-07	1.1e-06
Bk-249	2.4e-05	6.0e-09	1.2e-06	4.8e-05	1.2e-04	4.7e-06	1.2e-09	2.4e-07	9.4e-06	2.3e-05
Cf-248	1.3e-06	8.4e-09	4.3e-07	3.5e-06	5.1e-06	2.6e-07	1.7e-09	8.5e-08	6.9e-07	1.0e-06
Cf-249	3.5e-02	1.8e-04	8.9e-03	9.2e-02	1.5e-01	6.9e-03	3.5e-05	1.7e-03	1.8e-02	3.0e-02
Cf-250	1.6e-06	8.4e-09	4.3e-07	4.3e-06	7.0e-06	3.2e-07	1.7e-09	8.4e-08	8.7e-07	1.4e-06
Cf-251	9.7e-03	4.9e-05	2.5e-03	2.6e-02	4.2e-02	1.9e-03	9.8e-06	4.9e-04	5.1e-03	8.3e-03
Cf-252	2.4e-06	1.4e-08	6.9e-07	6.6e-06	1.0e-05	4.8e-07	2.7e-09	1.4e-07	1.3e-06	2.0e-06
Cf-254	2.0e-09	1.7e-11	8.3e-10	4.3e-09	6.5e-09	4.0e-10	3.3e-12	1.6e-10	8.5e-10	1.3e-09
Es-254	7.3e-02	4.9e-04	2.5e-02	1.9e-01	2.7e-01	1.5e-02	1.0e-04	4.9e-03	3.7e-02	5.3e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.51 Normalized effective doses from all pathways: Slag disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	4.4e+00	3.9e-01	2.2e+00	9.6e+00	1.4e+01	8.6e-01	7.6e-02	4.4e-01	1.9e+00	2.8e+00
P-32	3.1e-03	1.6e-04	1.2e-03	6.9e-03	1.1e-02	6.1e-04	3.3e-05	2.3e-04	1.4e-03	2.2e-03
S-35	1.8e-04	1.7e-05	8.1e-05	3.7e-04	5.9e-04	3.5e-05	3.3e-06	1.6e-05	7.4e-05	1.2e-04
Cl-36	8.3e-04	5.3e-05	3.4e-04	1.8e-03	2.9e-03	1.6e-04	1.1e-05	6.7e-05	3.6e-04	5.6e-04
K-40	3.5e-01	3.2e-02	1.8e-01	7.8e-01	1.2e+00	7.0e-02	6.5e-03	3.6e-02	1.5e-01	2.3e-01
Ca-41	1.8e-04	1.0e-05	7.4e-05	4.0e-04	6.3e-04	3.6e-05	2.0e-06	1.5e-05	7.8e-05	1.2e-04
Ca-45	7.0e-04	6.1e-05	3.2e-04	1.5e-03	2.4e-03	1.4e-04	1.2e-05	6.3e-05	2.9e-04	4.7e-04
Sc-46	7.4e+00	7.7e-01	3.5e+00	1.5e+01	2.5e+01	1.5e+00	1.6e-01	6.9e-01	3.0e+00	4.9e+00
Cr-51	1.2e-02	0.0e+00	4.5e-03	3.2e-02	4.9e-02	2.4e-03	0.0e+00	8.9e-04	6.3e-03	9.6e-03
Mn-53	1.2e-05	1.0e-07	4.8e-06	3.2e-05	4.6e-05	2.4e-06	2.0e-08	9.5e-07	6.3e-06	8.9e-06
Mn-54	2.1e+00	1.9e-02	8.6e-01	5.2e+00	7.3e+00	4.1e-01	3.7e-03	1.7e-01	1.0e+00	1.4e+00
Fe-55	3.7e-06	0.0e+00	1.3e-06	9.7e-06	1.5e-05	7.2e-07	0.0e+00	2.6e-07	1.9e-06	2.9e-06
Fe-59	5.7e-02	0.0e+00	2.2e-02	1.5e-01	2.2e-01	1.1e-02	0.0e+00	4.3e-03	2.9e-02	4.3e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.6e+00	1.6e-01	7.4e-01	3.3e+00	5.3e+00	3.1e-01	3.3e-02	1.5e-01	6.5e-01	1.0e+00
Sr-89	8.8e-03	8.7e-04	4.1e-03	1.8e-02	2.9e-02	1.7e-03	1.8e-04	8.1e-04	3.7e-03	5.7e-03
Sr-90	5.5e-02	5.7e-03	2.6e-02	1.1e-01	1.8e-01	1.1e-02	1.1e-03	5.0e-03	2.2e-02	3.6e-02
Y-91	2.2e-02	2.3e-03	1.0e-02	4.7e-02	7.3e-02	4.4e-03	4.6e-04	2.1e-03	9.2e-03	1.4e-02
Zr-93	1.2e-03	1.2e-04	5.5e-04	2.6e-03	4.0e-03	2.4e-04	2.3e-05	1.1e-04	5.0e-04	8.1e-04
Zr-95	3.8e+00	4.1e-01	1.8e+00	7.9e+00	1.3e+01	7.5e-01	8.3e-02	3.5e-01	1.5e+00	2.6e+00
Nb-93m	2.6e-04	2.7e-05	1.2e-04	5.4e-04	8.8e-04	5.1e-05	5.4e-06	2.4e-05	1.1e-04	1.7e-04
Nb-94	7.6e+00	8.1e-01	3.5e+00	1.5e+01	2.6e+01	1.5e+00	1.7e-01	7.0e-01	3.0e+00	5.0e+00
Nb-95	1.9e+00	1.7e-01	8.6e-01	4.0e+00	6.1e+00	3.7e-01	3.4e-02	1.7e-01	7.9e-01	1.2e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.1e-01	0.0e+00	4.3e-02	3.0e-01	4.4e-01	2.2e-02	0.0e+00	8.5e-03	5.8e-02	8.6e-02
Sb-125	3.4e-02	0.0e+00	1.3e-02	8.9e-02	1.3e-01	6.7e-03	0.0e+00	2.5e-03	1.7e-02	2.6e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	3.2e-03	1.8e-04	1.2e-03	6.8e-03	1.1e-02	6.2e-04	3.6e-05	2.5e-04	1.3e-03	2.1e-03
I-129	1.9e-02	7.9e-04	6.8e-03	4.1e-02	6.6e-02	3.6e-03	1.6e-04	1.4e-03	7.9e-03	1.3e-02
I-131	3.5e-02	5.1e-04	8.7e-03	7.6e-02	1.4e-01	6.9e-03	1.0e-04	1.7e-03	1.5e-02	2.8e-02
Cs-134	8.1e-01	1.4e-02	1.1e-01	1.3e+00	3.2e+00	1.6e-01	2.9e-03	2.1e-02	2.6e-01	6.2e-01
Cs-135	1.4e-04	1.6e-06	1.7e-05	2.1e-04	5.4e-04	2.8e-05	3.1e-07	3.3e-06	4.1e-05	1.1e-04
Cs-137	3.0e-01	5.3e-03	3.9e-02	4.8e-01	1.2e+00	5.9e-02	1.1e-03	7.7e-03	9.5e-02	2.3e-01
Ba-133	1.5e+00	1.6e-01	7.0e-01	3.1e+00	5.1e+00	2.9e-01	3.3e-02	1.4e-01	6.0e-01	1.0e+00
Ce-139	4.0e-01	4.3e-02	1.9e-01	8.3e-01	1.4e+00	7.9e-02	8.7e-03	3.7e-02	1.6e-01	2.7e-01
Ce-141	1.2e-01	1.0e-02	5.3e-02	2.5e-01	3.8e-01	2.3e-02	2.1e-03	1.1e-02	4.9e-02	7.5e-02
Ce-144	2.6e-01	2.8e-02	1.2e-01	5.2e-01	8.6e-01	5.0e-02	5.6e-03	2.4e-02	1.0e-01	1.7e-01
Pm-147	6.7e-04	6.6e-05	3.1e-04	1.4e-03	2.2e-03	1.3e-04	1.3e-05	6.0e-05	2.8e-04	4.4e-04

Table F2.51 Normalized effective doses from all pathways: Slag disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.7e-04	4.5e-05	2.1e-04	9.9e-04	1.6e-03	9.2e-05	9.1e-06	4.2e-05	2.0e-04	3.2e-04
Eu-152	5.5e+00	5.9e-01	2.6e+00	1.1e+01	1.9e+01	1.1e+00	1.2e-01	5.0e-01	2.2e+00	3.7e+00
Eu-154	6.0e+00	6.4e-01	2.8e+00	1.2e+01	2.0e+01	1.2e+00	1.3e-01	5.5e-01	2.4e+00	4.0e+00
Eu-155	1.3e-01	1.4e-02	6.2e-02	2.7e-01	4.5e-01	2.6e-02	2.9e-03	1.2e-02	5.4e-02	9.0e-02
Gd-153	1.6e-01	1.7e-02	7.5e-02	3.3e-01	5.3e-01	3.1e-02	3.5e-03	1.5e-02	6.5e-02	1.1e-01
Tb-160	3.9e+00	4.0e-01	1.8e+00	8.1e+00	1.3e+01	7.6e-01	8.1e-02	3.6e-01	1.6e+00	2.5e+00
Tm-170	1.1e-02	1.2e-03	5.1e-03	2.2e-02	3.7e-02	2.1e-03	2.4e-04	1.0e-03	4.4e-03	7.3e-03
Tm-171	9.5e-04	1.0e-04	4.4e-04	1.9e-03	3.2e-03	1.9e-04	2.1e-05	8.7e-05	3.8e-04	6.3e-04
Ta-182	5.0e+00	5.3e-01	2.4e+00	1.0e+01	1.7e+01	9.9e-01	1.1e-01	4.7e-01	2.0e+00	3.4e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	9.3e+00	1.0e+00	4.3e+00	1.9e+01	3.2e+01	1.8e+00	2.0e-01	8.6e-01	3.7e+00	6.2e+00
Ra-228	5.7e+00	6.2e-01	2.7e+00	1.2e+01	2.0e+01	1.1e+00	1.3e-01	5.3e-01	2.3e+00	3.8e+00
Ac-227	1.2e+01	1.2e+00	5.4e+00	2.5e+01	4.0e+01	2.3e+00	2.4e-01	1.1e+00	4.9e+00	7.9e+00
Th-228	1.3e+01	1.4e+00	6.1e+00	2.7e+01	4.4e+01	2.6e+00	2.9e-01	1.2e+00	5.3e+00	8.7e+00
Th-229	1.1e+01	1.1e+00	5.0e+00	2.3e+01	3.7e+01	2.1e+00	2.1e-01	9.8e-01	4.5e+00	7.3e+00
Th-230	1.2e+00	1.1e-01	5.4e-01	2.5e+00	4.1e+00	2.4e-01	2.3e-02	1.1e-01	5.0e-01	8.1e-01
Th-232	2.0e+00	1.9e-01	9.2e-01	4.3e+00	6.9e+00	4.0e-01	3.9e-02	1.8e-01	8.6e-01	1.4e+00
Pa-231	3.3e+00	3.2e-01	1.5e+00	6.9e+00	1.1e+01	6.5e-01	6.5e-02	3.0e-01	1.4e+00	2.2e+00
U-232	4.7e+00	4.4e-01	2.1e+00	9.9e+00	1.6e+01	9.2e-01	8.9e-02	4.2e-01	1.9e+00	3.1e+00
U-233	1.1e+00	1.0e-01	5.0e-01	2.4e+00	3.8e+00	2.2e-01	2.1e-02	9.9e-02	4.7e-01	7.5e-01
U-234	1.1e+00	1.0e-01	4.9e-01	2.3e+00	3.7e+00	2.2e-01	2.1e-02	9.8e-02	4.6e-01	7.4e-01
U-235	1.6e+00	1.6e-01	7.2e-01	3.3e+00	5.2e+00	3.1e-01	3.3e-02	1.4e-01	6.4e-01	1.0e+00
U-236	1.0e+00	9.5e-02	4.6e-01	2.2e+00	3.4e+00	2.0e-01	1.9e-02	9.1e-02	4.3e-01	6.9e-01
U-238	1.0e+00	1.0e-01	4.7e-01	2.2e+00	3.5e+00	2.0e-01	2.0e-02	9.3e-02	4.3e-01	6.9e-01
Np-237	3.3e+00	3.4e-01	1.5e+00	7.0e+00	1.1e+01	6.5e-01	6.9e-02	3.0e-01	1.4e+00	2.2e+00
Pu-236	1.2e+00	1.1e-01	5.4e-01	2.6e+00	4.1e+00	2.4e-01	2.3e-02	1.1e-01	5.1e-01	8.1e-01
Pu-238	1.9e+00	1.8e-01	8.5e-01	4.0e+00	6.4e+00	3.7e-01	3.6e-02	1.7e-01	7.9e-01	1.3e+00
Pu-239	1.5e+00	1.4e-01	6.6e-01	3.1e+00	4.9e+00	2.9e-01	2.8e-02	1.3e-01	6.1e-01	9.8e-01
Pu-240	1.5e+00	1.4e-01	6.6e-01	3.1e+00	4.9e+00	2.9e-01	2.8e-02	1.3e-01	6.1e-01	9.8e-01
Pu-241	1.7e-02	1.6e-03	7.5e-03	3.5e-02	5.6e-02	3.3e-03	3.2e-04	1.5e-03	6.9e-03	1.1e-02
Pu-242	1.4e+00	1.3e-01	6.2e-01	2.9e+00	4.6e+00	2.7e-01	2.6e-02	1.2e-01	5.7e-01	9.1e-01
Pu-244	2.9e+00	3.1e-01	1.3e+00	6.0e+00	9.8e+00	5.7e-01	6.4e-02	2.6e-01	1.2e+00	1.9e+00
Am-241	4.5e+00	4.2e-01	2.0e+00	9.5e+00	1.5e+01	8.8e-01	8.5e-02	4.0e-01	1.9e+00	3.0e+00
Am-242m	4.5e+00	4.2e-01	2.0e+00	9.5e+00	1.5e+01	8.8e-01	8.6e-02	4.0e-01	1.9e+00	3.0e+00
Am-243	5.1e+00	5.0e-01	2.3e+00	1.1e+01	1.7e+01	1.0e+00	1.0e-01	4.6e-01	2.1e+00	3.4e+00
Cm-242	5.2e-01	4.9e-02	2.3e-01	1.1e+00	1.8e+00	1.0e-01	9.7e-03	4.6e-02	2.2e-01	3.5e-01
Cm-243	3.7e+00	3.7e-01	1.7e+00	7.9e+00	1.3e+01	7.3e-01	7.3e-02	3.4e-01	1.5e+00	2.5e+00
Cm-244	2.8e+00	2.6e-01	1.3e+00	5.9e+00	9.5e+00	5.5e-01	5.3e-02	2.5e-01	1.2e+00	1.9e+00
Cm-245	4.7e+00	4.5e-01	2.1e+00	9.9e+00	1.6e+01	9.2e-01	9.1e-02	4.2e-01	2.0e+00	3.2e+00
Cm-246	4.4e+00	4.2e-01	2.0e+00	9.4e+00	1.5e+01	8.7e-01	8.4e-02	4.0e-01	1.9e+00	3.0e+00
Cm-247	5.5e+00	5.7e-01	2.5e+00	1.2e+01	1.9e+01	1.1e+00	1.2e-01	5.1e-01	2.3e+00	3.6e+00
Cm-248	1.6e+01	1.5e+00	7.1e+00	3.3e+01	5.3e+01	3.1e+00	3.0e-01	1.4e+00	6.6e+00	1.1e+01
Bk-249	1.7e-02	1.6e-03	7.7e-03	3.6e-02	5.7e-02	3.3e-03	3.3e-04	1.5e-03	7.1e-03	1.1e-02
Cf-248	9.3e-01	8.7e-02	4.2e-01	2.0e+00	3.2e+00	1.8e-01	1.8e-02	8.3e-02	3.9e-01	6.3e-01
Cf-249	8.8e+00	8.8e-01	4.0e+00	1.9e+01	3.0e+01	1.7e+00	1.8e-01	7.9e-01	3.7e+00	5.9e+00
Cf-250	3.6e+00	3.4e-01	1.6e+00	7.6e+00	1.2e+01	7.1e-01	6.8e-02	3.2e-01	1.5e+00	2.4e+00
Cf-251	7.9e+00	7.6e-01	3.6e+00	1.7e+01	2.7e+01	1.6e+00	1.5e-01	7.1e-01	3.3e+00	5.3e+00
Cf-252	2.1e+00	1.9e-01	9.4e-01	4.4e+00	7.1e+00	4.1e-01	3.9e-02	1.9e-01	8.7e-01	1.4e+00
Cf-254	2.5e+00	2.3e-01	1.1e+00	5.4e+00	8.5e+00	4.9e-01	4.6e-02	2.2e-01	1.1e+00	1.7e+00
Es-254	4.9e+00	5.3e-01	2.3e+00	1.0e+01	1.6e+01	9.5e-01	1.1e-01	4.5e-01	2.0e+00	3.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.52 Normalized effective doses from external exposure: Slag disposal–industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	4.4e+00	3.9e-01	2.2e+00	9.6e+00	1.4e+01	8.6e-01	7.6e-02	4.4e-01	1.9e+00	2.8e+00
P-32	2.9e-03	1.5e-04	1.1e-03	6.3e-03	1.0e-02	5.6e-04	2.9e-05	2.1e-04	1.3e-03	2.0e-03
S-35	6.9e-06	7.1e-07	3.2e-06	1.4e-05	2.3e-05	1.4e-06	1.5e-07	6.3e-07	2.8e-06	4.6e-06
Cl-36	5.1e-04	3.2e-05	2.0e-04	1.1e-03	1.8e-03	1.0e-04	6.4e-06	4.1e-05	2.2e-04	3.5e-04
K-40	3.5e-01	3.2e-02	1.8e-01	7.8e-01	1.2e+00	6.9e-02	6.4e-03	3.5e-02	1.5e-01	2.3e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	3.8e-05	4.0e-06	1.8e-05	7.8e-05	1.3e-04	7.5e-06	8.2e-07	3.5e-06	1.5e-05	2.6e-05
Sc-46	7.4e+00	7.7e-01	3.5e+00	1.5e+01	2.5e+01	1.5e+00	1.6e-01	6.9e-01	3.0e+00	4.9e+00
Cr-51	1.2e-02	0.0e+00	4.5e-03	3.2e-02	4.9e-02	2.4e-03	0.0e+00	8.9e-04	6.3e-03	9.6e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.1e+00	1.9e-02	8.6e-01	5.2e+00	7.3e+00	4.1e-01	3.7e-03	1.7e-01	1.0e+00	1.4e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	5.7e-02	0.0e+00	2.2e-02	1.5e-01	2.2e-01	1.1e-02	0.0e+00	4.3e-03	2.9e-02	4.3e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.6e+00	1.6e-01	7.4e-01	3.3e+00	5.3e+00	3.1e-01	3.3e-02	1.5e-01	6.5e-01	1.0e+00
Sr-89	7.8e-03	7.7e-04	3.6e-03	1.6e-02	2.6e-02	1.5e-03	1.6e-04	7.2e-04	3.2e-03	5.0e-03
Sr-90	3.4e-02	3.6e-03	1.6e-02	6.9e-02	1.1e-01	6.6e-03	7.4e-04	3.1e-03	1.4e-02	2.3e-02
Y-91	2.1e-02	2.1e-03	9.7e-03	4.4e-02	6.9e-02	4.1e-03	4.3e-04	1.9e-03	8.6e-03	1.3e-02
Zr-93	2.5e-07	1.7e-08	1.0e-07	5.2e-07	8.5e-07	4.8e-08	3.5e-09	2.0e-08	1.0e-07	1.7e-07
Zr-95	3.8e+00	4.1e-01	1.8e+00	7.9e+00	1.3e+01	7.5e-01	8.3e-02	3.5e-01	1.5e+00	2.6e+00
Nb-93m	8.1e-05	6.5e-06	2.8e-05	1.2e-04	2.1e-04	1.2e-05	1.3e-06	5.6e-06	2.4e-05	4.1e-05
Nb-94	7.6e+00	8.1e-01	3.5e+00	1.5e+01	2.6e+01	1.5e+00	1.7e-01	7.0e-01	3.0e+00	5.0e+00
Nb-95	1.9e+00	1.7e-01	8.6e-01	4.0e+00	6.1e+00	3.7e-01	3.4e-02	1.7e-01	7.9e-01	1.2e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.1e-01	0.0e+00	4.3e-02	3.0e-01	4.4e-01	2.2e-02	0.0e+00	8.5e-03	5.8e-02	8.6e-02
Sb-125	3.4e-02	0.0e+00	1.3e-02	8.9e-02	1.3e-01	6.7e-03	0.0e+00	2.5e-03	1.7e-02	2.6e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.6e-03	9.9e-05	6.6e-04	3.6e-03	5.5e-03	3.2e-04	2.0e-05	1.3e-04	7.0e-04	1.1e-03
I-129	2.0e-03	1.2e-04	8.0e-04	4.3e-03	6.6e-03	3.9e-04	2.5e-05	1.6e-04	8.5e-04	1.3e-03
I-131	3.5e-02	5.1e-04	8.4e-03	7.8e-02	1.4e-01	6.9e-03	1.0e-04	1.7e-03	1.5e-02	2.7e-02
Cs-134	8.1e-01	1.4e-02	1.1e-01	1.3e+00	3.2e+00	1.6e-01	2.9e-03	2.1e-02	2.6e-01	6.2e-01
Cs-135	3.0e-06	5.4e-08	3.9e-07	4.8e-06	1.2e-05	5.9e-07	1.1e-08	7.7e-08	9.6e-07	2.3e-06
Cs-137	3.0e-01	5.3e-03	3.9e-02	4.8e-01	1.2e+00	5.9e-02	1.1e-03	7.7e-03	9.5e-02	2.3e-01
Ba-133	1.5e+00	1.6e-01	7.0e-01	3.1e+00	5.1e+00	2.9e-01	3.3e-02	1.4e-01	6.0e-01	1.0e+00
Ce-139	4.0e-01	4.3e-02	1.9e-01	8.3e-01	1.4e+00	7.9e-02	8.6e-03	3.7e-02	1.6e-01	2.7e-01
Ce-141	1.2e-01	1.0e-02	5.3e-02	2.5e-01	3.8e-01	2.3e-02	2.1e-03	1.1e-02	4.9e-02	7.4e-02
Ce-144	2.5e-01	2.7e-02	1.2e-01	5.1e-01	8.4e-01	4.9e-02	5.4e-03	2.3e-02	1.0e-01	1.7e-01
Pm-147	3.5e-05	3.7e-06	1.6e-05	7.1e-05	1.2e-04	6.8e-06	7.6e-07	3.2e-06	1.4e-05	2.3e-05

Table F2.52 Normalized effective doses from external exposure: Slag disposal-industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.6e-07	6.0e-08	2.6e-07	1.1e-06	1.9e-06	1.1e-07	1.2e-08	5.2e-08	2.3e-07	3.7e-07
Eu-152	5.5e+00	5.8e-01	2.6e+00	1.1e+01	1.8e+01	1.1e+00	1.2e-01	5.0e-01	2.2e+00	3.7e+00
Eu-154	6.0e+00	6.4e-01	2.8e+00	1.2e+01	2.0e+01	1.2e+00	1.3e-01	5.5e-01	2.4e+00	4.0e+00
Eu-155	1.3e-01	1.4e-02	6.2e-02	2.7e-01	4.5e-01	2.6e-02	2.9e-03	1.2e-02	5.3e-02	8.9e-02
Gd-153	1.6e-01	1.7e-02	7.5e-02	3.3e-01	5.3e-01	3.1e-02	3.5e-03	1.5e-02	6.4e-02	1.1e-01
Tb-160	3.9e+00	4.0e-01	1.8e+00	8.1e+00	1.3e+01	7.6e-01	8.1e-02	3.6e-01	1.6e+00	2.5e+00
Tm-170	9.7e-03	1.0e-03	4.5e-03	2.0e-02	3.3e-02	1.9e-03	2.1e-04	8.9e-04	3.9e-03	6.4e-03
Tm-171	7.5e-04	8.1e-05	3.5e-04	1.5e-03	2.6e-03	1.5e-04	1.6e-05	7.0e-05	3.0e-04	5.0e-04
Ta-182	5.0e+00	5.3e-01	2.4e+00	1.0e+01	1.7e+01	9.9e-01	1.1e-01	4.7e-01	2.0e+00	3.4e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	8.8e+00	9.4e-01	4.1e+00	1.8e+01	3.0e+01	1.7e+00	1.9e-01	8.1e-01	3.5e+00	5.9e+00
Ra-228	4.9e+00	5.3e-01	2.3e+00	1.0e+01	1.7e+01	9.7e-01	1.1e-01	4.5e-01	2.0e+00	3.3e+00
Ac-227	1.5e+00	1.7e-01	7.2e-01	3.1e+00	5.2e+00	3.0e-01	3.4e-02	1.4e-01	6.2e-01	1.0e+00
Th-228	7.7e+00	8.3e-01	3.6e+00	1.6e+01	2.6e+01	1.5e+00	1.7e-01	7.2e-01	3.1e+00	5.2e+00
Th-229	1.2e+00	1.3e-01	5.7e-01	2.5e+00	4.1e+00	2.4e-01	2.7e-02	1.1e-01	4.9e-01	8.1e-01
Th-230	1.3e-03	1.3e-04	5.8e-04	2.6e-03	4.3e-03	2.5e-04	2.7e-05	1.1e-04	5.1e-04	8.4e-04
Th-232	5.8e-02	4.1e-03	2.4e-02	1.2e-01	2.0e-01	1.1e-02	8.1e-04	4.8e-03	2.4e-02	4.0e-02
Pa-231	1.5e-01	1.6e-02	7.1e-02	3.1e-01	5.1e-01	3.0e-02	3.3e-03	1.4e-02	6.0e-02	1.0e-01
U-232	2.8e-01	2.0e-02	1.2e-01	6.0e-01	9.7e-01	5.5e-02	4.1e-03	2.3e-02	1.2e-01	1.9e-01
U-233	1.1e-03	1.1e-04	5.0e-04	2.2e-03	3.6e-03	2.1e-04	2.3e-05	9.8e-05	4.2e-04	7.1e-04
U-234	2.9e-04	3.1e-05	1.3e-04	5.8e-04	9.7e-04	5.6e-05	6.2e-06	2.6e-05	1.1e-04	1.9e-04
U-235	5.7e-01	6.2e-02	2.7e-01	1.2e+00	2.0e+00	1.1e-01	1.3e-02	5.3e-02	2.3e-01	3.8e-01
U-236	1.5e-04	1.6e-05	6.9e-05	3.0e-04	5.0e-04	2.9e-05	3.2e-06	1.4e-05	5.9e-05	9.9e-05
U-238	1.1e-01	1.2e-02	5.3e-02	2.3e-01	3.9e-01	2.2e-02	2.5e-03	1.0e-02	4.5e-02	7.6e-02
Np-237	8.4e-01	9.0e-02	3.9e-01	1.7e+00	2.9e+00	1.6e-01	1.8e-02	7.7e-02	3.4e-01	5.5e-01
Pu-236	3.1e-04	2.6e-05	1.3e-04	6.6e-04	1.0e-03	6.1e-05	5.2e-06	2.6e-05	1.3e-04	2.1e-04
Pu-238	9.7e-05	1.0e-05	4.5e-05	2.0e-04	3.3e-04	1.9e-05	2.1e-06	8.9e-06	3.9e-05	6.4e-05
Pu-239	2.2e-04	2.3e-05	1.0e-04	4.4e-04	7.4e-04	4.3e-05	4.8e-06	2.0e-05	8.8e-05	1.5e-04
Pu-240	9.3e-05	1.0e-05	4.4e-05	1.9e-04	3.2e-04	1.8e-05	2.0e-06	8.6e-06	3.8e-05	6.2e-05
Pu-241	9.3e-06	9.1e-07	4.2e-06	1.9e-05	3.1e-05	1.8e-06	1.8e-07	8.3e-07	3.8e-06	6.1e-06
Pu-242	8.2e-05	8.9e-06	3.9e-05	1.7e-04	2.8e-04	1.6e-05	1.8e-06	7.6e-06	3.3e-05	5.5e-05
Pu-244	1.6e+00	1.7e-01	7.4e-01	3.2e+00	5.4e+00	3.1e-01	3.5e-02	1.5e-01	6.4e-01	1.1e+00
Am-241	3.1e-02	3.3e-03	1.4e-02	6.3e-02	1.0e-01	6.1e-03	6.7e-04	2.8e-03	1.2e-02	2.1e-02
Am-242m	5.1e-02	5.5e-03	2.4e-02	1.0e-01	1.7e-01	1.0e-02	1.1e-03	4.7e-03	2.0e-02	3.4e-02
Am-243	6.7e-01	7.2e-02	3.2e-01	1.4e+00	2.3e+00	1.3e-01	1.5e-02	6.2e-02	2.7e-01	4.5e-01
Cm-242	9.2e-05	9.7e-06	4.3e-05	1.9e-04	3.1e-04	1.8e-05	2.0e-06	8.5e-06	3.7e-05	6.1e-05
Cm-243	4.4e-01	4.7e-02	2.1e-01	9.0e-01	1.5e+00	8.7e-02	9.6e-03	4.1e-02	1.8e-01	3.0e-01
Cm-244	7.4e-05	7.9e-06	3.5e-05	1.5e-04	2.5e-04	1.5e-05	1.6e-06	6.8e-06	3.0e-05	5.0e-05
Cm-245	2.5e-01	2.7e-02	1.2e-01	5.2e-01	8.6e-01	5.0e-02	5.5e-03	2.3e-02	1.0e-01	1.7e-01
Cm-246	6.9e-05	7.4e-06	3.2e-05	1.4e-04	2.3e-04	1.4e-05	1.5e-06	6.4e-06	2.8e-05	4.6e-05
Cm-247	1.4e+00	1.5e-01	6.7e-01	2.9e+00	4.8e+00	2.8e-01	3.1e-02	1.3e-01	5.7e-01	9.6e-01
Cm-248	5.2e-05	5.6e-06	2.4e-05	1.1e-04	1.7e-04	1.0e-05	1.1e-06	4.8e-06	2.1e-05	3.5e-05
Bk-249	2.7e-04	2.0e-05	1.1e-04	5.7e-04	9.3e-04	5.3e-05	3.9e-06	2.2e-05	1.1e-04	1.8e-04
Cf-248	6.8e-05	7.3e-06	3.2e-05	1.4e-04	2.3e-04	1.3e-05	1.5e-06	6.2e-06	2.7e-05	4.5e-05
Cf-249	1.4e+00	1.5e-01	6.7e-01	2.9e+00	4.8e+00	2.8e-01	3.1e-02	1.3e-01	5.7e-01	9.5e-01
Cf-250	6.9e-05	7.3e-06	3.2e-05	1.4e-04	2.3e-04	1.3e-05	1.5e-06	6.3e-06	2.7e-05	4.6e-05
Cf-251	4.0e-01	4.3e-02	1.9e-01	8.1e-01	1.3e+00	7.8e-02	8.7e-03	3.7e-02	1.6e-01	2.7e-01
Cf-252	1.1e-04	1.2e-05	5.2e-05	2.2e-04	3.7e-04	2.2e-05	2.4e-06	1.0e-05	4.4e-05	7.3e-05
Cf-254	1.5e-07	1.5e-08	7.0e-08	3.2e-07	5.0e-07	3.0e-08	3.1e-09	1.4e-08	6.2e-08	9.8e-08
Es-254	4.0e+00	4.3e-01	1.9e+00	8.2e+00	1.3e+01	7.8e-01	8.7e-02	3.7e-01	1.5e+00	2.7e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.53 Normalized effective doses from inhalation: Slag disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.3e-04	1.0e-05	6.3e-05	3.0e-04	4.5e-04	2.6e-05	2.1e-06	1.2e-05	5.9e-05	8.8e-05
P-32	3.0e-05	1.4e-06	1.1e-05	6.7e-05	1.1e-04	5.9e-06	2.9e-07	2.2e-06	1.3e-05	2.2e-05
S-35	1.2e-04	1.1e-05	5.3e-05	2.5e-04	4.1e-04	2.3e-05	2.2e-06	1.1e-05	5.0e-05	8.2e-05
Cl-36	2.0e-04	1.2e-05	8.0e-05	4.5e-04	7.2e-04	4.0e-05	2.3e-06	1.6e-05	8.9e-05	1.4e-04
K-40	2.0e-04	1.6e-05	9.7e-05	4.6e-04	7.1e-04	4.0e-05	3.3e-06	1.9e-05	9.1e-05	1.4e-04
Ca-41	3.0e-05	2.8e-06	1.4e-05	6.4e-05	1.0e-04	6.0e-06	5.7e-07	2.7e-06	1.3e-05	2.1e-05
Ca-45	3.2e-04	3.0e-05	1.4e-04	6.8e-04	1.1e-03	6.2e-05	5.9e-06	2.8e-05	1.3e-04	2.1e-04
Sc-46	5.7e-04	5.3e-05	2.6e-04	1.2e-03	2.0e-03	1.1e-04	1.1e-05	5.1e-05	2.4e-04	3.9e-04
Cr-51	5.3e-07	0.0e+00	1.9e-07	1.3e-06	2.2e-06	1.0e-07	0.0e+00	3.7e-08	2.6e-07	4.3e-07
Mn-53	3.3e-06	2.7e-06	1.3e-06	8.2e-06	1.2e-05	6.4e-07	5.4e-09	2.6e-07	1.6e-06	2.3e-06
Mn-54	1.0e-04	8.5e-07	4.2e-05	2.5e-04	3.6e-04	2.0e-05	1.7e-07	8.1e-06	5.0e-05	7.2e-05
Fe-55	8.4e-07	0.0e+00	3.1e-07	2.2e-06	3.4e-06	1.7e-07	0.0e+00	6.2e-08	4.3e-07	6.6e-07
Fe-59	3.9e-06	0.0e+00	1.8e-06	1.3e-05	2.0e-05	9.7e-07	0.0e+00	3.6e-07	2.5e-06	3.8e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.2e-05	5.6e-06	2.8e-05	1.3e-04	2.1e-04	1.2e-05	1.1e-06	5.5e-06	2.6e-05	4.2e-05
Sr-89	1.4e-04	1.2e-05	6.2e-05	3.0e-04	4.8e-04	2.7e-05	2.5e-06	1.2e-05	5.9e-05	9.4e-05
Sr-90	5.0e-03	4.7e-04	2.3e-03	1.1e-02	1.7e-02	9.9e-04	9.4e-05	4.5e-04	2.1e-03	3.4e-03
Y-91	8.5e-04	5.8e-05	2.9e-04	1.4e-03	2.2e-03	1.3e-04	1.2e-05	5.7e-05	2.8e-04	4.4e-04
Zr-93	1.1e-03	9.9e-05	4.8e-04	2.2e-03	3.6e-03	2.1e-04	2.0e-05	9.4e-05	4.4e-04	7.2e-04
Zr-95	4.8e-04	4.4e-05	2.1e-04	1.0e-03	1.6e-03	9.4e-05	8.8e-06	4.3e-05	2.0e-04	3.2e-04
Nb-93m	1.4e-04	1.3e-05	6.2e-05	2.9e-04	4.7e-04	2.7e-05	2.6e-06	1.2e-05	5.8e-05	9.2e-05
Nb-94	4.0e-03	3.7e-04	1.8e-03	8.5e-03	1.4e-02	7.9e-04	7.5e-05	3.6e-04	1.7e-03	2.7e-03
Nb-95	1.1e-04	8.8e-06	4.6e-05	2.3e-04	3.6e-04	2.1e-05	1.8e-06	9.2e-06	4.5e-05	7.1e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	9.3e-06	0.0e+00	3.4e-06	2.4e-05	3.8e-05	1.8e-06	0.0e+00	6.8e-07	4.7e-06	7.5e-06
Sb-125	1.1e-05	0.0e+00	4.2e-06	3.0e-05	4.6e-05	2.2e-06	0.0e+00	8.2e-07	5.9e-06	9.1e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.9e-04	1.1e-05	7.5e-05	4.3e-04	6.7e-04	3.8e-05	2.1e-06	1.5e-05	8.4e-05	1.3e-04
I-129	2.0e-03	1.1e-04	7.9e-04	4.5e-03	7.0e-03	4.0e-04	2.3e-05	1.6e-04	8.8e-04	1.4e-03
I-131	3.7e-05	3.1e-07	8.5e-06	8.7e-05	1.5e-04	7.3e-06	1.0e-07	1.7e-06	1.6e-05	3.0e-05
Cs-134	1.7e-04	2.7e-06	2.1e-05	2.7e-04	6.7e-04	3.3e-05	5.5e-07	4.2e-06	5.3e-05	1.3e-04
Cs-135	1.8e-05	2.9e-07	2.3e-06	2.9e-05	7.2e-05	3.5e-06	5.8e-08	4.5e-07	5.7e-06	1.4e-05
Cs-137	1.2e-04	2.0e-06	1.5e-05	2.0e-04	4.9e-04	2.4e-05	3.9e-07	3.0e-06	3.9e-05	9.6e-05
Ba-133	2.9e-04	2.7e-05	1.3e-04	8.1e-04	9.7e-04	5.6e-05	5.4e-06	2.6e-05	1.2e-04	1.9e-04
Ce-139	1.9e-04	1.8e-05	8.5e-05	4.0e-04	6.4e-04	3.7e-05	3.5e-06	1.7e-05	7.8e-05	1.3e-04
Ce-141	2.4e-04	2.0e-05	1.0e-04	5.3e-04	8.3e-04	4.7e-05	3.9e-06	2.1e-05	1.0e-04	1.6e-04
Ce-144	4.3e-03	4.0e-04	1.9e-03	9.1e-03	1.5e-02	8.4e-04	8.0e-05	3.8e-04	1.8e-03	2.8e-03
Pm-147	5.0e-04	4.7e-05	2.3e-04	1.1e-03	1.7e-03	9.8e-05	9.4e-06	4.5e-05	2.1e-04	3.4e-04

Table F2.53 Normalized effective doses from inhalation: Slag disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	4.2e-04	3.9e-05	1.9e-04	8.9e-04	1.4e-03	8.2e-05	7.8e-06	3.7e-05	1.7e-04	2.8e-04
Eu-152	4.3e-03	4.0e-04	1.9e-03	9.1e-03	1.5e-02	8.5e-04	8.1e-05	3.8e-04	1.8e-03	2.9e-03
Eu-154	5.6e-03	5.2e-04	2.5e-03	1.2e-02	1.9e-02	1.1e-03	1.0e-04	5.0e-04	2.3e-03	3.8e-03
Eu-155	7.4e-04	6.9e-05	3.4e-04	1.6e-03	2.5e-03	1.5e-04	1.4e-05	6.6e-05	3.1e-04	5.0e-04
Gd-153	2.0e-04	1.9e-05	9.1e-05	4.3e-04	7.0e-04	4.0e-05	3.8e-06	1.8e-05	8.5e-05	1.4e-04
Tb-160	6.2e-04	5.7e-05	2.8e-04	1.3e-03	2.1e-03	1.2e-04	1.1e-05	5.5e-05	2.6e-04	4.2e-04
Tm-170	6.9e-04	6.4e-05	3.1e-04	1.5e-03	2.3e-03	1.4e-04	1.3e-05	6.2e-05	2.9e-04	4.7e-04
Tm-171	1.4e-04	1.3e-05	6.3e-05	3.0e-04	4.8e-04	2.8e-05	2.6e-06	1.3e-05	5.9e-05	9.4e-05
Ta-182	9.5e-04	8.9e-05	4.3e-04	2.0e-03	3.3e-03	1.9e-04	1.8e-05	8.6e-05	4.0e-04	6.5e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.6e-01	3.3e-02	1.6e-01	7.6e-01	1.2e+00	7.0e-02	6.7e-03	3.2e-02	1.5e-01	2.4e-01
Ra-228	4.6e-01	4.1e-02	2.0e-01	1.0e+00	1.6e+00	9.1e-02	8.2e-03	4.0e-02	2.0e-01	3.1e-01
Ac-227	9.6e+00	9.0e-01	4.3e+00	2.0e+01	3.3e+01	1.8e+00	1.8e-01	8.6e-01	4.1e+00	6.5e+00
Th-228	5.3e+00	5.0e-01	2.4e+00	1.1e+01	1.8e+01	1.0e+00	1.0e-01	4.8e-01	2.2e+00	3.6e+00
Th-229	9.5e+00	8.9e-01	4.3e+00	2.0e+01	3.2e+01	1.9e+00	1.8e-01	8.5e-01	4.0e+00	6.4e+00
Th-230	1.2e+00	1.1e-01	5.2e-01	2.4e+00	3.9e+00	2.3e-01	2.2e-02	1.0e-01	4.8e-01	7.8e-01
Th-232	1.9e+00	1.8e-01	8.7e-01	4.1e+00	6.6e+00	3.8e-01	3.6e-02	1.7e-01	8.1e-01	1.3e+00
Pa-231	2.7e+00	2.6e-01	1.2e+00	5.8e+00	9.4e+00	5.4e-01	5.2e-02	2.5e-01	1.2e+00	1.9e+00
U-232	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.6e-01	8.2e-02	3.9e-01	1.8e+00	3.0e+00
U-233	1.1e+00	1.0e-01	5.0e-01	2.3e+00	3.8e+00	2.2e-01	2.1e-02	9.9e-02	4.7e-01	7.5e-01
U-234	1.1e+00	1.0e-01	4.9e-01	2.3e+00	3.7e+00	2.1e-01	2.0e-02	9.7e-02	4.6e-01	7.4e-01
U-235	9.8e-01	9.1e-02	4.4e-01	2.1e+00	3.3e+00	1.9e-01	1.8e-02	8.7e-02	4.1e-01	6.6e-01
U-236	1.0e+00	9.4e-02	4.5e-01	2.1e+00	3.4e+00	2.0e-01	1.9e-02	9.0e-02	4.2e-01	6.9e-01
U-238	9.1e-01	8.5e-02	4.1e-01	1.9e+00	3.1e+00	1.8e-01	1.7e-02	8.2e-02	3.8e-01	6.2e-01
Np-237	2.4e+00	2.2e-01	1.1e+00	5.1e+00	8.2e+00	4.7e-01	4.5e-02	2.1e-01	1.0e+00	1.6e+00
Pu-236	1.2e+00	1.1e-01	5.2e-01	2.5e+00	3.9e+00	2.3e-01	2.2e-02	1.0e-01	4.9e-01	7.8e-01
Pu-238	1.8e+00	1.6e-01	7.9e-01	3.7e+00	6.0e+00	3.5e-01	3.3e-02	1.6e-01	7.4e-01	1.2e+00
Pu-239	1.3e+00	1.2e-01	6.0e-01	2.8e+00	4.5e+00	2.6e-01	2.5e-02	1.2e-01	5.6e-01	9.0e-01
Pu-240	1.3e+00	1.2e-01	6.0e-01	2.8e+00	4.5e+00	2.6e-01	2.5e-02	1.2e-01	5.6e-01	9.0e-01
Pu-241	1.4e-02	1.3e-03	6.3e-03	3.0e-02	4.8e-02	2.6e-03	2.7e-04	1.3e-03	5.9e-03	9.5e-03
Pu-242	1.2e+00	1.2e-01	5.6e-01	2.6e+00	4.2e+00	2.4e-01	2.3e-02	1.1e-01	5.2e-01	8.3e-01
Pu-244	1.2e+00	1.1e-01	5.4e-01	2.5e+00	4.0e+00	2.3e-01	2.2e-02	1.1e-01	5.0e-01	8.0e-01
Am-241	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.5e-01	8.1e-02	3.9e-01	1.8e+00	2.9e+00
Am-242m	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.5e-01	8.1e-02	3.9e-01	1.8e+00	2.9e+00
Am-243	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.5e-01	8.1e-02	3.9e-01	1.8e+00	2.9e+00
Cm-242	5.1e-01	4.8e-02	2.3e-01	1.1e+00	1.7e+00	1.0e-01	9.6e-03	4.6e-02	2.1e-01	3.4e-01
Cm-243	3.2e+00	3.0e-01	1.4e+00	6.8e+00	1.1e+01	6.3e-01	6.0e-02	2.9e-01	1.3e+00	2.2e+00
Cm-244	2.7e+00	2.5e-01	1.2e+00	5.8e+00	9.3e+00	5.3e-01	5.1e-02	2.4e-01	1.1e+00	1.8e+00
Cm-245	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.5e-01	8.1e-02	3.9e-01	1.8e+00	2.9e+00
Cm-246	4.3e+00	4.0e-01	2.0e+00	9.2e+00	1.5e+01	8.5e-01	8.1e-02	3.9e-01	1.8e+00	2.9e+00
Cm-247	4.0e+00	3.7e-01	1.8e+00	8.5e+00	1.4e+01	7.9e-01	7.5e-02	3.6e-01	1.7e+00	2.7e+00
Cm-248	1.5e+01	1.4e+00	6.9e+00	3.2e+01	5.2e+01	3.0e+00	2.9e-01	1.4e+00	6.4e+00	1.0e+01
Bk-249	1.6e-02	1.5e-03	7.3e-03	3.4e-02	5.5e-02	3.2e-03	3.0e-04	1.4e-03	6.8e-03	1.1e-02
Cf-248	9.2e-01	8.5e-02	4.1e-01	1.9e+00	3.1e+00	1.8e-01	1.7e-02	8.2e-02	3.9e-01	6.2e-01
Cf-249	7.2e+00	6.7e-01	3.2e+00	1.5e+01	2.5e+01	1.4e+00	1.4e-01	6.4e-01	3.0e+00	4.9e+00
Cf-250	3.5e+00	3.3e-01	1.6e+00	7.4e+00	1.2e+01	6.9e-01	6.6e-02	3.1e-01	1.5e+00	2.4e+00
Cf-251	7.4e+00	6.9e-01	3.3e+00	1.6e+01	2.5e+01	1.4e+00	1.4e-01	6.6e-01	3.1e+00	5.0e+00
Cf-252	2.0e+00	1.9e-01	9.1e-01	4.3e+00	6.9e+00	4.0e-01	3.8e-02	1.8e-01	8.5e-01	1.4e+00
Cf-254	2.4e+00	2.1e-01	1.1e+00	5.2e+00	8.1e+00	4.6e-01	4.3e-02	2.1e-01	1.0e+00	1.6e+00
Es-254	8.9e-01	8.4e-02	4.0e-01	1.9e+00	3.0e+00	1.8e-01	1.7e-02	8.0e-02	3.8e-01	6.0e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.54 Normalized effective doses from ingestion: Slag disposal–industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	7.0e-04	1.8e-05	2.7e-04	1.7e-03	2.5e-03	1.4e-04	3.6e-06	5.3e-05	3.3e-04	4.9e-04
P-32	2.1e-04	4.2e-06	7.0e-05	4.9e-04	8.3e-04	4.2e-05	8.4e-07	1.4e-05	9.6e-05	1.6e-04
S-35	5.0e-05	1.4e-06	1.8e-05	1.1e-04	1.8e-04	9.9e-06	2.9e-07	3.6e-06	2.2e-05	3.5e-05
Cl-36	1.2e-04	2.6e-06	4.0e-05	2.8e-04	4.6e-04	2.4e-05	5.1e-07	8.1e-06	5.6e-05	9.0e-05
K-40	1.4e-03	3.6e-05	5.3e-04	3.4e-03	5.0e-03	2.7e-04	7.2e-06	1.1e-04	6.7e-04	9.9e-04
Ca-41	1.5e-04	4.4e-06	5.6e-05	3.4e-04	5.4e-04	3.0e-05	9.0e-07	1.1e-05	6.7e-05	1.1e-04
Ca-45	3.5e-04	9.9e-06	1.3e-04	7.7e-04	1.2e-03	6.8e-05	2.0e-06	2.5e-05	1.5e-04	2.4e-04
Sc-46	5.9e-04	1.7e-05	2.2e-04	1.3e-03	2.1e-03	1.2e-04	3.4e-06	4.3e-05	2.6e-04	4.1e-04
Cr-51	1.8e-06	0.0e+00	5.5e-07	4.8e-06	8.0e-06	3.6e-07	0.0e+00	1.1e-07	9.6e-07	1.6e-06
Mn-53	9.0e-06	5.4e-08	3.4e-06	2.4e-05	3.6e-05	1.8e-06	1.0e-08	6.7e-07	4.8e-06	7.0e-06
Mn-54	2.0e-04	1.2e-06	7.4e-05	5.3e-04	7.9e-04	3.9e-05	2.3e-07	1.5e-05	1.0e-04	1.5e-04
Fe-55	2.8e-06	0.0e+00	9.1e-07	7.6e-06	1.2e-05	5.5e-07	0.0e+00	1.8e-07	1.5e-06	2.3e-06
Fe-59	9.2e-06	0.0e+00	3.0e-06	2.5e-05	3.8e-05	1.8e-06	0.0e+00	5.9e-07	4.8e-06	7.5e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.0e-04	5.8e-06	7.5e-05	4.6e-04	7.2e-04	4.0e-05	1.2e-06	1.5e-05	9.0e-05	1.4e-04
Sr-89	8.5e-04	2.4e-05	3.1e-04	1.9e-03	3.1e-03	1.7e-04	4.9e-06	6.2e-05	3.8e-04	6.0e-04
Sr-90	1.6e-02	4.6e-04	5.9e-03	3.6e-02	5.7e-02	3.2e-03	9.5e-05	1.2e-03	7.1e-03	1.1e-02
Y-91	8.4e-04	2.4e-05	3.1e-04	1.9e-03	3.0e-03	1.6e-04	4.9e-06	6.1e-05	3.7e-04	5.9e-04
Zr-93	1.5e-04	4.3e-06	5.4e-05	3.3e-04	5.2e-04	2.9e-05	8.7e-07	1.1e-05	6.5e-05	1.0e-04
Zr-95	4.4e-04	1.3e-05	1.6e-04	9.8e-04	1.6e-03	8.7e-05	2.6e-06	3.2e-05	1.9e-04	3.0e-04
Nb-93m	6.3e-05	1.8e-06	2.3e-05	1.4e-04	2.2e-04	1.2e-05	3.7e-07	4.5e-06	2.8e-05	4.4e-05
Nb-94	9.0e-04	2.6e-05	3.3e-04	2.0e-03	3.2e-03	1.8e-04	5.3e-06	6.4e-05	3.9e-04	6.2e-04
Nb-95	1.6e-04	4.3e-06	5.7e-05	3.5e-04	5.6e-04	3.1e-05	8.6e-07	1.1e-05	7.0e-05	1.1e-04
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	1.6e-05	0.0e+00	5.0e-06	4.4e-05	7.1e-05	3.2e-06	0.0e+00	1.0e-06	8.6e-06	1.4e-05
Sb-125	1.2e-05	0.0e+00	3.8e-06	3.4e-05	5.4e-05	2.4e-06	0.0e+00	7.5e-07	6.6e-06	1.1e-05
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.3e-03	2.8e-05	4.5e-04	2.9e-03	5.0e-03	2.6e-04	5.6e-06	8.9e-05	5.8e-04	9.7e-04
I-129	1.5e-02	3.2e-04	4.9e-03	3.3e-02	5.3e-02	2.9e-03	6.3e-05	9.7e-04	6.4e-03	1.0e-02
I-131	2.4e-04	1.5e-06	4.7e-05	5.3e-04	1.0e-03	4.8e-05	3.0e-07	9.3e-06	1.1e-04	2.0e-04
Cs-134	1.1e-03	7.2e-06	1.2e-04	1.5e-03	4.2e-03	2.2e-04	1.4e-06	2.4e-05	3.0e-04	8.2e-04
Cs-135	1.2e-04	7.8e-07	1.3e-05	1.7e-04	4.5e-04	2.4e-05	1.5e-07	2.6e-06	3.3e-05	9.0e-05
Cs-137	8.0e-04	5.1e-06	8.5e-05	1.1e-03	2.9e-03	1.6e-04	9.8e-07	1.7e-05	2.1e-04	5.8e-04
Ba-133	5.3e-04	1.5e-05	1.9e-04	1.2e-03	1.8e-03	1.0e-04	3.1e-06	3.8e-05	2.3e-04	3.6e-04
Ce-139	1.2e-04	3.3e-06	4.2e-05	2.6e-04	4.1e-04	2.3e-05	6.8e-07	8.3e-06	5.0e-05	8.0e-05
Ce-141	1.8e-04	4.9e-06	6.6e-05	4.1e-04	6.5e-04	3.6e-05	9.9e-07	1.3e-05	8.1e-05	1.3e-04
Ce-144	2.6e-03	7.4e-05	9.3e-04	5.7e-03	9.0e-03	5.0e-04	1.5e-05	1.8e-04	1.1e-03	1.7e-03
Pm-147	1.3e-04	3.9e-06	4.9e-05	3.0e-04	4.7e-04	2.6e-05	7.9e-07	9.6e-06	5.9e-05	9.2e-05

Table F2.54 Normalized effective doses from ingestion: Slag disposal–industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.2e-05	1.5e-06	1.9e-05	1.2e-04	1.8e-04	1.0e-05	3.0e-07	3.7e-06	2.3e-05	3.6e-05
Eu-152	7.4e-04	2.1e-05	2.7e-04	1.6e-03	2.6e-03	1.5e-04	4.3e-06	5.3e-05	3.2e-04	5.1e-04
Eu-154	1.1e-03	3.0e-05	3.8e-04	2.3e-03	3.7e-03	2.1e-04	6.1e-06	7.5e-05	4.6e-04	7.2e-04
Eu-155	1.7e-04	4.8e-06	6.1e-05	3.7e-04	5.9e-04	3.3e-05	9.7e-07	1.2e-05	7.3e-05	1.1e-04
Gd-153	1.3e-04	3.7e-06	4.7e-05	2.9e-04	4.6e-04	2.5e-05	7.6e-07	9.3e-06	5.6e-05	8.8e-05
Tb-160	6.1e-04	1.7e-05	2.2e-04	1.4e-03	2.2e-03	1.2e-04	3.5e-06	4.4e-05	2.7e-04	4.2e-04
Tm-170	5.7e-04	1.6e-05	2.1e-04	1.3e-03	2.0e-03	1.1e-04	3.3e-06	4.1e-05	2.5e-04	3.9e-04
Tm-171	5.6e-05	1.6e-06	2.0e-05	1.3e-04	2.0e-04	1.1e-05	3.3e-07	4.0e-06	2.5e-05	3.8e-05
Te-182	6.4e-04	1.8e-05	2.3e-04	1.4e-03	2.3e-03	1.3e-04	3.7e-06	4.6e-05	2.8e-04	4.4e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.5e-01	4.3e-03	5.4e-02	3.3e-01	5.3e-01	2.9e-02	8.7e-04	1.1e-02	6.5e-02	1.0e-01
Ra-228	3.5e-01	1.0e-02	1.3e-01	7.9e-01	1.2e+00	6.9e-02	2.1e-03	2.5e-02	1.5e-01	2.4e-01
Ac-227	6.4e-01	1.8e-02	2.3e-01	1.4e+00	2.2e+00	1.3e-01	3.7e-03	4.6e-02	2.8e-01	4.4e-01
Th-228	5.4e-02	1.5e-03	2.0e-02	1.2e-01	1.9e-01	1.1e-02	3.2e-04	3.9e-03	2.4e-02	3.7e-02
Th-229	1.7e-01	4.8e-03	6.1e-02	3.8e-01	5.9e-01	3.3e-02	9.9e-04	1.2e-02	7.4e-02	1.2e-01
Th-230	4.6e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01	9.1e-03	2.7e-04	3.3e-03	2.0e-02	3.2e-02
Th-232	5.3e-02	1.5e-03	1.9e-02	1.2e-01	1.9e-01	1.0e-02	3.1e-04	3.8e-03	2.3e-02	3.7e-02
Pa-231	3.8e-01	1.1e-02	1.4e-01	8.4e-01	1.3e+00	7.4e-02	2.2e-03	2.7e-02	1.7e-01	2.6e-01
U-232	2.2e-02	6.2e-04	7.8e-03	4.8e-02	7.6e-02	4.2e-03	1.3e-04	1.5e-03	9.5e-03	1.5e-02
U-233	4.5e-03	1.3e-04	1.6e-03	1.0e-02	1.6e-02	8.9e-04	2.6e-05	3.2e-04	2.0e-03	3.1e-03
U-234	4.4e-03	1.3e-04	1.6e-03	9.8e-03	1.5e-02	8.6e-04	2.6e-05	3.1e-04	1.9e-03	3.0e-03
U-235	4.6e-03	1.3e-04	1.7e-03	1.0e-02	1.6e-02	9.0e-04	2.7e-05	3.3e-04	2.0e-03	3.1e-03
U-236	4.2e-03	1.2e-04	1.5e-03	9.3e-03	1.5e-02	8.2e-04	2.5e-05	3.0e-04	1.8e-03	2.9e-03
U-238	5.8e-03	1.7e-04	2.1e-03	1.3e-02	2.0e-02	1.1e-03	3.4e-05	4.2e-04	2.5e-03	4.0e-03
Np-237	5.9e-02	1.7e-03	2.1e-02	1.3e-01	2.1e-01	1.2e-02	3.4e-04	4.2e-03	2.6e-02	4.1e-02
Pu-236	4.5e-02	1.3e-03	1.6e-02	9.9e-02	1.5e-01	8.8e-03	2.6e-04	3.2e-03	1.9e-02	3.0e-02
Pu-238	1.2e-01	3.5e-03	4.4e-02	2.7e-01	4.3e-01	2.4e-02	7.1e-04	8.7e-03	5.3e-02	8.4e-02
Pu-239	1.3e-01	3.8e-03	4.8e-02	3.0e-01	4.7e-01	2.6e-02	7.7e-04	9.5e-03	5.8e-02	9.1e-02
Pu-240	1.3e-01	3.8e-03	4.8e-02	3.0e-01	4.7e-01	2.6e-02	7.7e-04	9.5e-03	5.8e-02	9.1e-02
Pu-241	2.5e-03	7.2e-05	9.0e-04	5.6e-03	8.8e-03	4.9e-04	1.5e-05	1.8e-04	1.1e-03	1.7e-03
Pu-242	1.3e-01	3.7e-03	4.6e-02	2.8e-01	4.5e-01	2.5e-02	7.4e-04	9.1e-03	5.6e-02	8.7e-02
Pu-244	1.3e-01	3.7e-03	4.6e-02	2.9e-01	4.5e-01	2.5e-02	7.4e-04	9.1e-03	5.6e-02	8.8e-02
Am-241	1.1e-01	3.0e-03	3.8e-02	2.4e-01	3.7e-01	2.1e-02	6.1e-04	7.6e-03	4.6e-02	7.3e-02
Am-242m	1.1e-01	3.0e-03	3.8e-02	2.4e-01	3.7e-01	2.1e-02	6.1e-04	7.6e-03	4.6e-02	7.3e-02
Am-243	1.1e-01	3.0e-03	3.8e-02	2.4e-01	3.7e-01	2.1e-02	6.2e-04	7.6e-03	4.7e-02	7.3e-02
Cm-242	5.6e-03	1.6e-04	2.0e-03	1.2e-02	1.9e-02	1.1e-03	3.2e-05	4.0e-04	2.4e-03	3.8e-03
Cm-243	8.0e-02	2.3e-03	2.9e-02	1.8e-01	2.8e-01	1.6e-02	4.7e-04	5.7e-03	3.5e-02	5.4e-02
Cm-244	6.4e-02	1.8e-03	2.3e-02	1.4e-01	2.2e-01	1.2e-02	3.7e-04	4.5e-03	2.8e-02	4.3e-02
Cm-245	1.1e-01	3.2e-03	4.0e-02	2.5e-01	3.9e-01	2.2e-02	6.5e-04	7.9e-03	4.9e-02	7.6e-02
Cm-246	1.1e-01	3.2e-03	4.0e-02	2.5e-01	3.9e-01	2.2e-02	6.5e-04	7.9e-03	4.9e-02	7.6e-02
Cm-247	1.0e-01	2.9e-03	3.7e-02	2.3e-01	3.5e-01	2.0e-02	5.9e-04	7.2e-03	4.4e-02	6.9e-02
Cm-248	4.1e-01	1.2e-02	1.5e-01	9.1e-01	1.4e+00	8.0e-02	2.4e-03	2.9e-02	1.8e-01	2.8e-01
Bk-249	5.1e-04	1.5e-05	1.9e-04	1.1e-03	1.8e-03	1.0e-04	3.0e-06	3.6e-05	2.2e-04	3.5e-04
Cf-248	1.4e-02	4.0e-04	5.1e-03	3.1e-02	4.9e-02	2.8e-03	8.2e-05	1.0e-03	6.1e-03	9.6e-03
Cf-249	1.9e-01	5.3e-03	6.7e-02	4.2e-01	6.5e-01	3.6e-02	1.1e-03	1.3e-02	8.1e-02	1.3e-01
Cf-250	8.5e-02	2.4e-03	3.1e-02	1.9e-01	2.9e-01	1.7e-02	4.9e-04	6.0e-03	3.7e-02	5.8e-02
Cf-251	1.9e-01	5.5e-03	6.9e-02	4.3e-01	6.7e-01	3.8e-02	1.1e-03	1.4e-02	8.3e-02	1.3e-01
Cf-252	4.7e-02	1.3e-03	1.7e-02	1.0e-01	1.6e-01	9.1e-03	2.7e-04	3.3e-03	2.0e-02	3.2e-02
Cf-254	1.4e-01	4.0e-03	5.2e-02	3.2e-01	5.0e-01	2.8e-02	8.2e-04	1.0e-02	6.3e-02	9.8e-02
Es-254	1.4e-02	4.1e-04	5.1e-03	3.1e-02	5.0e-02	2.8e-03	8.3e-05	1.0e-03	6.1e-03	9.7e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.55 Normalized effective doses from all pathways: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.9e+00	2.8e-02	7.5e-01	5.4e+00	7.7e+00	3.8e-01	5.6e-03	1.5e-01	1.1e+00	1.5e+00
P-32	1.3e-03	1.1e-05	4.2e-04	3.3e-03	5.4e-03	2.6e-04	2.1e-06	8.3e-05	6.4e-04	1.0e-03
S-35	7.4e-05	1.0e-06	2.9e-05	1.9e-04	2.9e-04	1.5e-05	2.1e-07	5.8e-06	3.7e-05	5.5e-05
Cl-36	3.5e-04	3.9e-06	1.2e-04	9.2e-04	1.4e-03	6.9e-05	7.6e-07	2.4e-05	1.8e-04	2.7e-04
K-40	1.6e-01	2.3e-03	6.1e-02	4.3e-01	6.1e-01	3.1e-02	4.6e-04	1.2e-02	8.4e-02	1.2e-01
Ca-41	7.7e-05	7.9e-07	2.6e-05	2.1e-04	3.1e-04	1.5e-05	1.6e-07	5.1e-06	4.1e-05	6.1e-05
Ca-45	2.9e-04	4.0e-06	1.1e-04	7.7e-04	1.1e-03	5.8e-05	7.9e-07	2.2e-05	1.5e-04	2.2e-04
Sc-46	3.1e+00	4.6e-02	1.3e+00	8.1e+00	1.2e+01	6.1e-01	9.1e-03	2.5e-01	1.6e+00	2.3e+00
Cr-51	5.9e-03	0.0e+00	1.2e-03	1.7e-02	2.7e-02	1.2e-03	0.0e+00	2.4e-04	3.2e-03	5.2e-03
Mn-53	5.9e-06	1.2e-08	1.5e-06	1.7e-05	2.7e-05	1.2e-06	2.4e-09	3.0e-07	3.4e-06	5.3e-06
Mn-54	1.0e+00	2.4e-03	2.8e-01	3.1e+00	4.4e+00	2.0e-01	4.9e-04	5.7e-02	6.0e-01	8.7e-01
Fe-55	1.8e-06	0.0e+00	3.7e-07	5.0e-06	8.2e-06	3.5e-07	0.0e+00	7.3e-08	9.9e-07	1.6e-06
Fe-59	2.8e-02	0.0e+00	6.5e-03	8.0e-02	1.3e-01	5.4e-03	0.0e+00	1.3e-03	1.6e-02	2.5e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.6e-01	9.5e-03	2.7e-01	1.7e+00	2.5e+00	1.3e-01	1.9e-03	5.3e-02	3.4e-01	4.9e-01
Sr-89	3.7e-03	5.2e-05	1.5e-03	9.6e-03	1.4e-02	7.3e-04	1.1e-05	2.9e-04	1.9e-03	2.7e-03
Sr-90	2.3e-02	3.4e-04	9.2e-03	6.1e-02	8.6e-02	4.6e-03	6.8e-05	1.8e-03	1.2e-02	1.7e-02
Y-91	9.3e-03	1.3e-04	3.7e-03	2.4e-02	3.5e-02	1.8e-03	2.7e-05	7.4e-04	4.8e-03	6.8e-03
Zr-93	5.1e-04	7.1e-06	2.0e-04	1.3e-03	1.9e-03	1.0e-04	1.4e-06	4.0e-05	2.6e-04	3.7e-04
Zr-95	1.6e+00	2.4e-02	6.5e-01	4.2e+00	6.0e+00	3.2e-01	4.8e-03	1.3e-01	8.4e-01	1.2e+00
Nb-93m	1.1e-04	1.6e-06	4.4e-05	2.8e-04	4.1e-04	2.2e-05	3.2e-07	8.8e-06	5.6e-05	8.0e-05
Nb-94	3.2e+00	4.8e-02	1.3e+00	8.3e+00	1.2e+01	6.3e-01	9.5e-03	2.5e-01	1.7e+00	2.3e+00
Nb-95	7.8e-01	1.0e-02	3.1e-01	2.0e+00	3.0e+00	1.5e-01	2.1e-03	6.1e-02	3.9e-01	5.9e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.5e-02	0.0e+00	1.2e-02	1.6e-01	2.5e-01	1.1e-02	0.0e+00	2.4e-03	3.1e-02	5.0e-02
Sb-125	1.7e-02	0.0e+00	3.6e-03	4.8e-02	7.6e-02	3.3e-03	0.0e+00	7.2e-04	9.4e-03	1.5e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.3e-03	1.3e-05	4.3e-04	3.4e-03	5.3e-03	2.6e-04	2.7e-06	8.5e-05	6.7e-04	1.1e-03
I-129	7.7e-03	8.3e-05	2.3e-03	2.0e-02	3.2e-02	1.5e-03	1.3e-05	4.5e-04	3.9e-03	6.3e-03
I-131	1.5e-02	4.0e-05	2.5e-03	3.5e-02	6.7e-02	2.9e-03	8.2e-06	4.9e-04	7.1e-03	1.3e-02
Cs-134	2.7e-01	9.8e-04	3.6e-02	4.5e-01	1.1e+00	5.4e-02	1.9e-04	7.2e-03	8.8e-02	2.2e-01
Cs-135	4.8e-05	1.2e-07	5.5e-06	7.7e-05	1.9e-04	9.5e-06	2.4e-08	1.1e-06	1.5e-05	3.6e-05
Cs-137	1.0e-01	3.6e-04	1.3e-02	1.7e-01	4.2e-01	2.0e-02	7.1e-05	2.7e-03	3.3e-02	8.2e-02
Ba-133	8.3e-01	9.4e-03	2.5e-01	1.7e+00	2.3e+00	1.2e-01	1.9e-03	5.0e-02	3.3e-01	4.6e-01
Ce-139	1.7e-01	2.5e-03	6.8e-02	4.4e-01	6.3e-01	3.3e-02	5.0e-04	1.4e-02	8.7e-02	1.2e-01
Ce-141	4.9e-02	6.4e-04	1.9e-02	1.3e-01	1.9e-01	9.7e-03	1.3e-04	3.8e-03	2.5e-02	3.7e-02
Ce-144	1.1e-01	1.6e-03	4.4e-02	2.8e-01	4.0e-01	2.1e-02	3.2e-04	8.7e-03	5.6e-02	7.8e-02
Pm-147	2.8e-04	4.0e-06	1.1e-04	7.2e-04	1.1e-03	5.5e-05	8.0e-07	2.2e-05	1.4e-04	2.1e-04

Table F2.55 Normalized effective doses from all pathways: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.0e-04	2.6e-06	7.7e-05	5.1e-04	7.4e-04	3.9e-05	5.5e-07	1.5e-05	9.9e-05	1.5e-04
Eu-152	2.3e+00	3.4e-02	9.2e-01	6.0e+00	8.5e+00	4.5e-01	6.9e-03	1.8e-01	1.2e+00	1.7e+00
Eu-154	2.5e+00	3.8e-02	1.0e+00	6.6e+00	9.4e+00	4.9e-01	7.5e-03	2.0e-01	1.3e+00	1.8e+00
Eu-155	5.6e-02	8.3e-04	2.2e-02	1.5e-01	2.1e-01	1.1e-02	1.7e-04	4.5e-03	2.9e-02	4.1e-02
Gd-153	6.7e-02	1.0e-03	2.7e-02	1.8e-01	2.5e-01	1.3e-02	2.0e-04	5.4e-03	3.5e-02	4.9e-02
Tb-160	1.6e+00	2.4e-02	6.5e-01	4.2e+00	6.1e+00	3.2e-01	4.7e-03	1.3e-01	8.3e-01	1.2e+00
Tm-170	4.6e-03	6.9e-05	1.9e-03	1.2e-02	1.7e-02	9.0e-04	1.4e-05	3.7e-04	2.4e-03	3.3e-03
Tm-171	4.0e-04	6.1e-06	1.6e-04	1.0e-03	1.5e-03	7.8e-05	1.2e-06	3.3e-05	2.1e-04	2.9e-04
Ta-182	2.1e+00	3.1e-02	8.5e-01	5.5e+00	7.9e+00	4.2e-01	6.2e-03	1.7e-01	1.1e+00	1.6e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.9e+00	5.9e-02	1.6e+00	1.0e+01	1.5e+01	7.7e-01	1.2e-02	3.1e-01	2.0e+00	2.8e+00
Ra-228	2.4e+00	3.7e-02	9.8e-01	6.4e+00	8.9e+00	4.7e-01	7.2e-03	1.9e-01	1.2e+00	1.7e+00
Ac-227	4.9e+00	7.1e-02	2.0e+00	1.3e+01	1.9e+01	9.8e-01	1.4e-02	3.9e-01	2.5e+00	3.7e+00
Th-228	5.5e+00	8.4e-02	2.3e+00	1.4e+01	2.0e+01	1.1e+00	1.7e-02	4.5e-01	2.8e+00	4.0e+00
Th-229	4.6e+00	6.5e-02	1.8e+00	1.2e+01	1.7e+01	9.0e-01	1.3e-02	3.6e-01	2.3e+00	3.4e+00
Th-230	5.0e-01	7.0e-03	2.0e-01	1.3e+00	1.9e+00	9.9e-02	1.4e-03	3.9e-02	2.5e-01	3.8e-01
Th-232	8.5e-01	1.2e-02	3.3e-01	2.2e+00	3.3e+00	1.7e-01	2.4e-03	6.6e-02	4.3e-01	6.4e-01
Pa-231	1.4e+00	2.0e-02	5.4e-01	3.5e+00	5.1e+00	2.7e-01	3.9e-03	1.1e-01	7.0e-01	1.0e+00
U-232	2.0e+00	2.7e-02	7.6e-01	5.0e+00	7.5e+00	3.9e-01	5.4e-03	1.5e-01	9.9e-01	1.5e+00
U-233	1.7e-01	6.5e-03	1.8e-01	1.2e+00	1.8e+00	9.2e-02	1.3e-03	3.6e-02	2.4e-01	3.5e-01
U-234	4.6e-01	6.4e-03	1.8e-01	1.2e+00	1.8e+00	9.1e-02	1.3e-03	3.5e-02	2.3e-01	3.4e-01
U-235	6.5e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00	1.3e-01	1.9e-03	5.2e-02	3.3e-01	4.7e-01
U-236	4.3e-01	5.9e-03	1.6e-01	1.1e+00	1.6e+00	8.4e-02	1.2e-03	3.2e-02	2.1e-01	3.2e-01
U-238	4.3e-01	6.1e-03	1.7e-01	1.1e+00	1.7e+00	8.6e-02	1.2e-03	3.4e-02	2.2e-01	3.2e-01
Np-237	1.4e+00	2.0e-02	5.5e-01	3.6e+00	5.2e+00	2.7e-01	4.0e-03	1.1e-01	7.1e-01	1.0e+00
Pu-236	5.1e-01	7.1e-03	2.0e-01	1.3e+00	1.9e+00	1.0e-01	1.4e-03	3.9e-02	2.6e-01	3.8e-01
Pu-238	7.9e-01	1.1e-02	3.1e-01	2.0e+00	3.0e+00	1.5e-01	2.2e-03	6.1e-02	4.0e-01	5.9e-01
Pu-239	6.1e-01	8.6e-03	2.4e-01	1.6e+00	2.3e+00	1.2e-01	1.7e-03	4.8e-02	3.1e-01	4.6e-01
Pu-240	6.1e-01	8.6e-03	2.4e-01	1.6e+00	2.3e+00	1.2e-01	1.7e-03	4.8e-02	3.1e-01	4.6e-01
Pu-241	7.0e-03	9.8e-05	2.7e-03	1.8e-02	2.6e-02	1.4e-03	2.0e-05	5.4e-04	3.5e-03	5.2e-03
Pu-242	5.7e-01	8.0e-03	2.2e-01	1.5e+00	2.2e+00	1.1e-01	1.6e-03	4.4e-02	2.9e-01	4.2e-01
Pu-244	1.2e+00	1.9e-02	5.0e-01	3.2e+00	4.5e+00	2.4e-01	3.7e-03	9.9e-02	6.3e-01	8.7e-01
Am-241	1.9e+00	2.6e-02	7.3e-01	4.8e+00	7.2e+00	3.7e-01	5.1e-03	1.4e-01	9.4e-01	1.4e+00
Am-242m	1.9e+00	2.6e-02	7.3e-01	4.9e+00	7.3e+00	3.7e-01	5.2e-03	1.5e-01	9.5e-01	1.4e+00
Am-243	2.1e+00	3.1e-02	8.4e-01	5.5e+00	8.2e+00	4.2e-01	6.1e-03	1.7e-01	1.1e+00	1.6e+00
Cm-242	2.2e-01	3.0e-03	8.4e-02	5.6e-01	8.2e-01	4.3e-02	6.0e-04	1.7e-02	1.1e-01	1.6e-01
Cm-243	1.6e+00	2.2e-02	6.1e-01	4.0e+00	5.9e+00	3.1e-01	4.4e-03	1.2e-01	7.9e-01	1.2e+00
Cm-244	1.2e+00	1.6e-02	4.5e-01	3.0e+00	4.5e+00	2.3e-01	3.2e-03	9.0e-02	5.9e-01	8.6e-01
Cm-245	2.0e+00	2.8e-02	7.7e-01	5.1e+00	7.5e+00	3.9e-01	5.5e-03	1.5e-01	9.9e-01	1.5e+00
Cm-246	1.9e+00	2.6e-02	7.2e-01	4.8e+00	7.2e+00	3.7e-01	5.1e-03	1.4e-01	9.4e-01	1.4e+00
Cm-247	2.3e+00	3.4e-02	9.3e-01	6.0e+00	8.7e+00	4.6e-01	6.7e-03	1.8e-01	1.2e+00	1.7e+00
Cm-248	6.6e+00	9.1e-02	2.5e+00	1.7e+01	2.5e+01	1.3e+00	1.8e-02	5.1e-01	3.3e+00	4.9e+00
Bk-249	7.1e-03	9.9e-05	2.8e-03	1.8e-02	2.7e-02	1.4e-03	2.0e-05	5.5e-04	3.6e-03	5.3e-03
Cf-248	3.9e-01	5.4e-03	1.5e-01	1.0e+00	1.5e+00	7.7e-02	1.1e-03	3.0e-02	2.0e-01	2.9e-01
Cf-249	3.7e+00	5.4e-02	1.5e+00	9.5e+00	1.4e+01	7.3e-01	1.1e-02	2.9e-01	1.9e+00	2.7e+00
Cf-250	1.5e+00	2.1e-02	5.8e-01	3.9e+00	5.8e+00	3.0e-01	4.1e-03	1.2e-01	7.6e-01	1.1e+00
Cf-251	3.3e+00	4.7e-02	1.3e+00	8.6e+00	1.3e+01	6.6e-01	9.3e-03	2.6e-01	1.7e+00	2.5e+00
Cf-252	8.7e-01	1.2e-02	3.4e-01	2.2e+00	3.3e+00	1.7e-01	2.4e-03	6.7e-02	4.4e-01	6.5e-01
Cf-254	1.0e+00	1.4e-02	4.0e-01	2.7e+00	4.0e+00	2.1e-01	2.8e-03	8.0e-02	5.3e-01	7.8e-01
Es-254	2.1e+00	3.1e-02	8.4e-01	5.4e+00	7.6e+00	4.1e-01	6.2e-03	1.7e-01	1.1e+00	1.5e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.58 Normalized effective doses from external exposure: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	1.9e+00	2.8e-02	7.5e-01	5.4e+00	7.7e+00	3.8e-01	5.6e-03	1.5e-01	1.1e+00	1.5e+00
P-32	1.2e-03	9.8e-06	3.8e-04	3.0e-03	5.0e-03	2.4e-04	2.0e-06	7.6e-05	5.9e-04	9.7e-04
S-35	2.9e-06	4.2e-08	1.2e-06	7.5e-06	1.1e-05	5.7e-07	8.5e-09	2.3e-07	1.5e-06	2.1e-06
Cl-36	2.1e-04	2.3e-06	7.3e-05	5.6e-04	8.7e-04	4.2e-05	4.6e-07	1.5e-05	1.1e-04	1.7e-04
K-40	1.5e-01	2.3e-03	8.0e-02	4.3e-01	6.1e-01	3.1e-02	4.6e-04	1.2e-02	8.4e-02	1.2e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.6e-05	2.4e-07	6.4e-06	4.2e-05	6.0e-05	3.1e-06	4.7e-08	1.3e-06	8.2e-06	1.2e-05
Sc-46	3.1e+00	4.6e-02	1.3e+00	8.1e+00	1.2e+01	6.1e-01	9.1e-03	2.5e-01	1.6e+00	2.3e+00
Cr-51	5.9e-03	0.0e+00	1.2e-03	1.7e-02	2.7e-02	1.2e-03	0.0e+00	2.4e-04	3.2e-03	5.2e-03
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.0e+00	2.4e-03	2.8e-01	3.1e+00	4.4e+00	2.0e-01	4.9e-04	5.7e-02	6.0e-01	8.7e-01
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	2.8e-02	0.0e+00	6.5e-03	8.0e-02	1.3e-01	5.4e-03	0.0e+00	1.3e-03	1.6e-02	2.5e-02
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	6.6e-01	9.5e-03	2.7e-01	1.7e+00	2.5e+00	1.3e-01	1.9e-03	5.3e-02	3.4e-01	4.9e-01
Sr-89	3.3e-03	4.6e-05	1.3e-03	8.5e-03	1.2e-02	6.4e-04	9.2e-06	2.6e-04	1.7e-03	2.4e-03
Sr-90	1.4e-02	2.1e-04	5.7e-03	3.7e-02	5.3e-02	2.8e-03	4.2e-05	1.1e-03	7.4e-03	1.0e-02
Y-91	8.7e-03	1.2e-04	3.5e-03	2.3e-02	3.3e-02	1.7e-03	2.5e-05	6.9e-04	4.4e-03	6.4e-03
Zr-93	1.0e-07	1.2e-09	3.5e-08	2.7e-07	4.1e-07	2.0e-08	2.3e-10	6.9e-09	5.3e-08	8.2e-08
Zr-95	1.6e+00	2.4e-02	6.5e-01	4.2e+00	6.0e+00	3.2e-01	4.8e-03	1.3e-01	8.4e-01	1.2e+00
Nb-93m	2.5e-05	3.8e-07	1.0e-05	6.7e-05	9.5e-05	5.0e-06	7.7e-08	2.0e-06	1.3e-05	1.8e-05
Nb-94	3.2e+00	4.8e-02	1.3e+00	8.3e+00	1.2e+01	6.3e-01	9.5e-03	2.5e-01	1.7e+00	2.3e+00
Nb-95	7.8e-01	1.0e-02	3.1e-01	2.0e+00	3.0e+00	1.5e-01	2.1e-03	6.1e-02	3.9e-01	5.9e-01
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.5e-02	0.0e+00	1.2e-02	1.6e-01	2.5e-01	1.1e-02	0.0e+00	2.4e-03	3.1e-02	5.0e-02
Sb-125	1.7e-02	0.0e+00	3.6e-03	4.8e-02	7.6e-02	3.3e-03	0.0e+00	7.2e-04	9.4e-03	1.5e-02
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	6.9e-04	7.3e-06	2.3e-04	1.8e-03	2.8e-03	1.4e-04	1.4e-06	4.6e-05	3.4e-04	5.4e-04
I-129	8.3e-04	9.1e-06	2.8e-04	2.1e-03	3.4e-03	1.6e-04	1.8e-06	5.4e-05	4.2e-04	6.6e-04
I-131	1.5e-02	4.0e-05	2.5e-03	3.5e-02	6.6e-02	2.9e-03	8.1e-06	4.9e-04	7.0e-03	1.3e-02
Cs-134	2.7e-01	9.8e-04	3.6e-02	4.5e-01	1.1e+00	5.4e-02	1.9e-04	7.2e-03	8.8e-02	2.2e-01
Cs-135	1.0e-06	3.7e-09	1.4e-07	1.7e-06	4.2e-06	2.0e-07	7.2e-10	2.7e-08	3.3e-07	8.2e-07
Cs-137	1.0e-01	3.6e-04	1.3e-02	1.7e-01	4.1e-01	2.0e-02	7.1e-05	2.7e-03	3.3e-02	8.1e-02
Ba-133	6.3e-01	9.4e-03	2.5e-01	1.6e+00	2.3e+00	1.2e-01	1.9e-03	5.0e-02	3.3e-01	4.6e-01
Ce-139	1.7e-01	2.5e-03	6.8e-02	4.4e-01	6.3e-01	3.3e-02	5.0e-04	1.4e-02	8.7e-02	1.2e-01
Ce-141	4.9e-02	6.4e-04	1.9e-02	1.3e-01	1.9e-01	9.6e-03	1.3e-04	3.8e-03	2.5e-02	3.7e-02
Ce-144	1.0e-01	1.6e-03	4.2e-02	2.8e-01	3.9e-01	2.1e-02	3.1e-04	8.4e-03	5.4e-02	7.6e-02
Pm-147	1.5e-05	2.2e-07	5.8e-06	3.8e-05	5.4e-05	2.9e-06	4.4e-08	1.2e-06	7.6e-06	1.1e-05

Table F2.56 Normalized effective doses from external exposure: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.3e-07	3.5e-09	9.4e-08	6.2e-07	8.7e-07	4.6e-08	7.1e-10	1.9e-08	1.2e-07	1.7e-07
Eu-152	2.3e+00	3.4e-02	9.2e-01	6.0e+00	8.5e+00	4.5e-01	6.8e-03	1.8e-01	1.2e+00	1.7e+00
Eu-154	2.5e+00	3.7e-02	1.0e+00	6.6e+00	9.3e+00	4.9e-01	7.5e-03	2.0e-01	1.3e+00	1.8e+00
Eu-155	5.5e-02	8.3e-04	2.2e-02	1.5e-01	2.1e-01	1.1e-02	1.7e-04	4.4e-03	2.9e-02	4.0e-02
Gd-153	6.7e-02	1.0e-03	2.7e-02	1.8e-01	2.5e-01	1.3e-02	2.0e-04	5.4e-03	3.5e-02	4.9e-02
Tb-160	1.6e+00	2.4e-02	6.5e-01	4.2e+00	6.1e+00	3.2e-01	4.7e-03	1.3e-01	8.3e-01	1.2e+00
Tm-170	4.0e-03	6.0e-05	1.6e-03	1.1e-02	1.5e-02	8.0e-04	1.2e-05	3.3e-04	2.1e-03	3.0e-03
Tm-171	3.2e-04	4.7e-06	1.3e-04	8.3e-04	1.2e-03	6.2e-05	9.5e-07	2.5e-05	1.6e-04	2.3e-04
Ta-182	2.1e+00	3.1e-02	8.5e-01	5.5e+00	7.9e+00	4.2e-01	6.2e-03	1.7e-01	1.1e+00	1.6e+00
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.7e+00	5.5e-02	1.5e+00	9.7e+00	1.4e+01	7.3e-01	1.1e-02	2.9e-01	1.9e+00	2.7e+00
Ra-228	2.1e+00	3.1e-02	8.3e-01	5.4e+00	7.7e+00	4.1e-01	6.2e-03	1.6e-01	1.1e+00	1.5e+00
Ac-227	6.5e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00	1.3e-01	1.9e-03	5.2e-02	3.4e-01	4.7e-01
Th-228	3.2e+00	4.9e-02	1.3e+00	8.5e+00	1.2e+01	6.4e-01	9.7e-03	2.6e-01	1.7e+00	2.4e+00
Th-229	5.1e-01	7.7e-03	2.1e-01	1.3e+00	1.9e+00	1.0e-01	1.5e-03	4.1e-02	2.7e-01	3.7e-01
Th-230	5.3e-04	7.8e-06	2.1e-04	1.4e-03	2.0e-03	1.0e-04	1.6e-06	4.1e-05	2.8e-04	3.8e-04
Th-232	2.4e-02	2.8e-04	8.2e-03	6.4e-02	9.7e-02	4.8e-03	5.4e-05	1.6e-03	1.3e-02	1.9e-02
Pa-231	6.3e-02	9.6e-04	2.5e-02	1.7e-01	2.4e-01	1.2e-02	1.9e-04	5.1e-03	3.3e-02	4.6e-02
U-232	1.2e-01	1.4e-03	4.0e-02	3.1e-01	4.7e-01	2.3e-02	2.7e-04	7.8e-03	6.1e-02	9.3e-02
U-233	4.4e-04	6.7e-06	1.8e-04	1.2e-03	1.7e-03	8.8e-05	1.3e-06	3.5e-05	2.3e-04	3.2e-04
U-234	1.2e-04	1.8e-06	4.8e-05	3.1e-04	4.5e-04	2.4e-05	3.6e-07	9.5e-06	6.2e-05	8.7e-05
U-235	2.4e-01	3.6e-03	9.6e-02	6.3e-01	9.0e-01	4.7e-02	7.2e-04	1.9e-02	1.3e-01	1.7e-01
U-236	6.2e-05	9.3e-07	2.5e-05	1.6e-04	2.3e-04	1.2e-05	1.9e-07	4.9e-06	3.2e-05	4.5e-05
U-238	4.8e-02	7.2e-04	1.9e-02	1.3e-01	1.8e-01	9.4e-03	1.4e-04	3.8e-03	2.5e-02	3.5e-02
Np-237	3.5e-01	5.3e-03	1.4e-01	9.2e-01	1.3e+00	6.9e-02	1.1e-03	2.8e-02	1.8e-01	2.6e-01
Pu-236	1.3e-04	1.6e-06	4.5e-05	3.4e-04	5.1e-04	2.5e-05	3.1e-07	8.9e-06	6.6e-05	1.0e-04
Pu-238	4.1e-05	6.1e-07	1.6e-05	1.1e-04	1.5e-04	8.0e-06	1.2e-07	3.3e-06	2.1e-05	2.9e-05
Pu-239	9.2e-05	1.4e-06	3.7e-05	2.4e-04	3.4e-04	1.8e-05	2.7e-07	7.3e-06	4.8e-05	6.6e-05
Pu-240	3.9e-05	5.9e-07	1.6e-05	1.0e-04	1.5e-04	7.7e-06	1.2e-07	3.1e-06	2.1e-05	2.8e-05
Pu-241	3.9e-06	5.4e-08	1.5e-06	1.0e-05	1.5e-05	7.8e-07	1.1e-08	2.9e-07	2.0e-06	2.9e-06
Pu-242	3.5e-05	5.2e-07	1.4e-05	9.1e-05	1.3e-04	6.8e-06	1.0e-07	2.8e-06	1.8e-05	2.5e-05
Pu-244	6.7e-01	1.0e-02	2.7e-01	1.7e+00	2.5e+00	1.3e-01	2.0e-03	5.3e-02	3.5e-01	4.8e-01
Am-241	1.3e-02	1.9e-04	5.2e-03	3.4e-02	4.8e-02	2.5e-03	3.9e-05	1.0e-03	6.7e-03	9.4e-03
Am-242m	2.1e-02	3.2e-04	8.5e-03	5.6e-02	7.9e-02	4.2e-03	6.4e-05	1.7e-03	1.1e-02	1.5e-02
Am-243	2.8e-01	4.3e-03	1.1e-01	7.4e-01	1.1e+00	5.6e-02	8.5e-04	2.3e-02	1.5e-01	2.0e-01
Cm-242	3.8e-05	5.7e-07	1.6e-05	1.0e-04	1.4e-04	7.6e-06	1.1e-07	3.1e-06	2.0e-05	2.8e-05
Cm-243	1.9e-01	2.8e-03	7.4e-02	4.9e-01	6.9e-01	3.7e-02	5.5e-04	1.5e-02	9.7e-02	1.3e-01
Cm-244	3.1e-05	4.7e-07	1.2e-05	8.1e-05	1.2e-04	6.1e-06	9.3e-08	2.5e-06	1.6e-05	2.3e-05
Cm-245	1.1e-01	1.6e-03	4.3e-02	2.8e-01	4.0e-01	2.1e-02	3.2e-04	8.5e-03	5.6e-02	7.7e-02
Cm-246	2.9e-05	4.3e-07	1.2e-05	7.6e-05	1.1e-04	5.7e-06	8.5e-08	2.3e-06	1.5e-05	2.1e-05
Cm-247	6.0e-01	9.0e-03	2.4e-01	1.6e+00	2.2e+00	1.2e-01	1.8e-03	4.8e-02	3.1e-01	4.4e-01
Cm-248	2.2e-05	3.3e-07	8.7e-06	5.7e-05	8.1e-05	4.3e-06	6.5e-08	1.7e-06	1.1e-05	1.6e-05
Bk-249	1.1e-04	1.3e-06	3.8e-05	3.0e-04	4.5e-04	2.2e-05	2.6e-07	7.6e-06	5.8e-05	8.9e-05
Cf-248	2.8e-05	4.3e-07	1.1e-05	7.5e-05	1.1e-04	5.6e-06	8.5e-08	2.3e-06	1.5e-05	2.1e-05
Cf-249	6.0e-01	9.0e-03	2.4e-01	1.6e+00	2.2e+00	1.2e-01	1.8e-03	4.8e-02	3.1e-01	4.3e-01
Cf-250	2.9e-05	4.3e-07	1.2e-05	7.5e-05	1.1e-04	5.7e-06	8.6e-08	2.3e-06	1.5e-05	2.1e-05
Cf-251	1.7e-01	2.5e-03	6.7e-02	4.4e-01	6.2e-01	3.3e-02	5.0e-04	1.3e-02	8.7e-02	1.2e-01
Cf-252	4.6e-05	6.9e-07	1.9e-05	1.2e-04	1.7e-04	9.1e-06	1.4e-07	3.7e-06	2.4e-05	3.3e-05
Cf-254	6.3e-08	9.1e-10	2.5e-08	1.6e-07	2.4e-07	1.2e-08	1.8e-10	5.0e-09	3.2e-08	4.7e-08
Es-254	1.7e+00	2.5e-02	6.7e-01	4.4e+00	6.3e+00	3.3e-01	5.0e-03	1.3e-01	8.7e-01	1.2e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.57 Normalized effective doses from inhalation: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	5.8e-05	7.5e-07	2.2e-05	1.6e-04	2.3e-04	1.1e-05	1.5e-07	4.4e-06	3.1e-05	4.6e-05
P-32	1.3e-05	9.8e-08	3.8e-06	3.1e-05	5.1e-05	2.5e-06	2.0e-08	7.5e-07	6.1e-06	9.9e-06
S-35	5.0e-05	6.8e-07	1.9e-05	1.3e-04	1.9e-04	9.9e-06	1.4e-07	3.8e-06	2.6e-05	3.7e-05
Cl-36	8.4e-05	8.5e-07	2.8e-05	2.2e-04	3.4e-04	1.7e-05	1.7e-07	5.5e-06	4.3e-05	6.7e-05
K-40	9.0e-05	1.2e-06	3.4e-05	2.5e-04	3.6e-04	1.8e-05	2.4e-07	6.8e-06	4.8e-05	7.1e-05
Ca-41	1.3e-05	1.8e-07	4.9e-06	3.3e-05	4.9e-05	2.5e-06	3.5e-08	9.8e-07	6.5e-06	9.5e-06
Ca-45	1.3e-04	1.8e-06	5.1e-05	3.5e-04	5.1e-04	2.6e-05	3.6e-07	1.0e-05	6.8e-05	1.0e-04
Sc-46	2.4e-04	3.2e-06	9.3e-05	6.2e-04	9.2e-04	4.8e-05	6.5e-07	1.8e-05	1.2e-04	1.8e-04
Cr-51	2.5e-07	0.0e+00	4.9e-08	7.0e-07	1.2e-06	5.0e-08	0.0e+00	9.9e-09	1.4e-07	2.3e-07
Mn-53	1.6e-06	3.7e-09	4.2e-07	4.6e-06	6.9e-06	3.1e-07	7.5e-10	8.4e-08	9.1e-07	1.3e-06
Mn-54	4.9e-05	1.1e-07	1.3e-05	1.4e-04	2.1e-04	9.6e-06	2.3e-08	2.6e-06	2.8e-05	4.2e-05
Fe-55	4.0e-07	0.0e+00	9.4e-08	1.2e-06	1.8e-06	8.0e-08	0.0e+00	1.8e-08	2.4e-07	3.7e-07
Fe-59	2.3e-06	0.0e+00	5.4e-07	6.8e-06	1.1e-05	4.6e-07	0.0e+00	1.1e-07	1.3e-06	2.1e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.6e-05	3.4e-07	9.9e-06	6.7e-05	9.9e-05	5.1e-06	6.9e-08	2.0e-06	1.3e-05	1.9e-05
Sr-89	5.8e-05	7.6e-07	2.2e-05	1.5e-04	2.2e-04	1.2e-05	1.5e-07	4.4e-06	3.0e-05	4.4e-05
Sr-90	2.1e-03	2.9e-05	8.1e-04	5.5e-03	8.2e-03	4.2e-04	5.8e-06	1.6e-04	1.1e-03	1.6e-03
Y-91	2.7e-04	3.6e-06	1.0e-04	6.9e-04	1.0e-03	5.3e-05	7.2e-07	2.0e-05	1.4e-04	2.0e-04
Zr-93	4.4e-04	6.1e-06	1.7e-04	1.1e-03	1.7e-03	8.8e-05	1.2e-06	3.4e-05	2.2e-04	3.3e-04
Zr-95	2.0e-04	2.7e-06	7.7e-05	5.2e-04	7.6e-04	3.9e-05	5.5e-07	1.5e-05	1.0e-04	1.5e-04
Nb-93m	5.8e-05	8.0e-07	2.2e-05	1.5e-04	2.2e-04	1.1e-05	1.6e-07	4.4e-06	2.9e-05	4.3e-05
Nb-94	1.7e-03	2.3e-05	6.5e-04	4.3e-03	6.5e-03	3.3e-04	4.6e-06	1.3e-04	8.5e-04	1.3e-03
Nb-95	4.4e-05	5.5e-07	1.7e-05	1.1e-04	1.7e-04	8.8e-06	1.1e-07	3.3e-06	2.3e-05	3.3e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	4.5e-06	0.0e+00	9.1e-07	1.3e-05	2.1e-05	8.9e-07	0.0e+00	1.8e-07	2.5e-06	4.1e-06
Sb-125	5.5e-06	0.0e+00	1.1e-06	1.6e-05	2.6e-05	1.1e-06	0.0e+00	2.2e-07	3.2e-06	5.0e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	8.0e-05	8.0e-07	2.6e-05	2.1e-04	3.2e-04	1.6e-05	1.6e-07	5.1e-06	4.0e-05	6.3e-05
I-129	8.4e-04	8.5e-06	2.7e-04	2.2e-03	3.4e-03	1.7e-04	1.7e-06	5.3e-05	4.3e-04	6.8e-04
I-131	1.5e-05	4.1e-08	2.5e-06	3.7e-05	6.9e-05	3.1e-06	8.3e-09	5.1e-07	7.2e-06	1.4e-05
Cs-134	5.7e-05	1.9e-07	7.4e-06	9.3e-05	2.3e-04	1.1e-05	3.8e-08	1.4e-06	1.9e-05	4.5e-05
Cs-135	8.1e-06	2.1e-08	7.8e-07	9.9e-06	2.4e-05	1.2e-06	4.1e-09	1.5e-07	2.0e-06	4.8e-06
Cs-137	4.1e-05	1.4e-07	5.3e-06	6.7e-05	1.6e-04	8.2e-06	2.8e-08	1.0e-06	1.3e-05	3.3e-05
Ba-133	1.2e-04	1.7e-06	4.6e-05	3.1e-04	4.6e-04	2.4e-05	3.3e-07	9.2e-06	6.0e-05	9.0e-05
Ce-139	7.9e-05	1.1e-06	3.0e-05	2.0e-04	3.0e-04	1.6e-05	2.2e-07	6.0e-06	4.0e-05	5.9e-05
Ce-141	1.0e-04	1.2e-06	3.7e-05	2.6e-04	3.9e-04	2.0e-05	2.5e-07	7.4e-06	5.1e-05	7.7e-05
Ce-144	1.8e-03	2.5e-05	6.9e-04	4.6e-03	6.8e-03	3.5e-04	4.9e-06	1.4e-04	9.0e-04	1.3e-03
Pm-147	2.1e-04	2.9e-06	8.1e-05	5.4e-04	8.0e-04	4.1e-05	5.7e-07	1.6e-05	1.1e-04	1.6e-04

Table F2.57 Normalized effective doses from inhalation: Slag disposal-municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-04	2.4e-06	6.7e-05	4.5e-04	6.7e-04	3.4e-05	4.8e-07	1.3e-05	8.8e-05	1.3e-04
Eu-152	1.8e-03	2.5e-05	6.9e-04	4.7e-03	7.0e-03	3.6e-04	4.9e-06	1.4e-04	9.1e-04	1.3e-03
Eu-154	2.3e-03	3.2e-05	9.0e-04	6.0e-03	9.0e-03	4.6e-04	6.3e-06	1.8e-04	1.2e-03	1.7e-03
Eu-155	3.1e-04	4.3e-06	1.2e-04	8.1e-04	1.2e-03	6.1e-05	8.5e-07	2.4e-05	1.6e-04	2.3e-04
Gd-153	8.5e-05	1.2e-06	3.3e-05	2.2e-04	3.2e-04	1.7e-05	2.3e-07	6.5e-06	4.3e-05	6.4e-05
Tb-160	2.6e-04	3.5e-06	9.9e-05	6.7e-04	9.8e-04	5.1e-05	6.9e-07	2.0e-05	1.3e-04	1.9e-04
Tm-170	2.9e-04	4.0e-06	1.1e-04	7.5e-04	1.1e-03	5.7e-05	7.9e-07	2.2e-05	1.5e-04	2.2e-04
Tm-171	5.9e-05	8.2e-07	2.3e-05	1.5e-04	2.3e-04	1.2e-05	1.6e-07	4.5e-06	3.0e-05	4.4e-05
Ta-182	4.0e-04	5.5e-06	1.5e-04	1.0e-03	1.5e-03	7.9e-05	1.1e-06	3.1e-05	2.0e-04	3.0e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	1.5e-01	2.1e-03	5.8e-02	3.9e-01	5.8e-01	3.0e-02	4.1e-04	1.1e-02	7.6e-02	1.1e-01
Ra-228	1.9e-01	2.6e-03	7.3e-02	5.0e-01	7.5e-01	3.8e-02	5.1e-04	1.5e-02	1.0e-01	1.5e-01
Ac-227	4.0e+00	5.6e-02	1.5e+00	1.0e+01	1.6e+01	8.0e-01	1.1e-02	3.1e-01	2.0e+00	3.0e+00
Th-228	2.2e+00	3.1e-02	8.6e-01	5.8e+00	8.6e+00	4.4e-01	6.1e-03	1.7e-01	1.1e+00	1.7e+00
Th-229	4.0e+00	5.5e-02	1.5e+00	1.0e+01	1.5e+01	7.9e-01	1.1e-02	3.1e-01	2.0e+00	3.0e+00
Th-230	4.8e-01	6.7e-03	1.9e-01	1.3e+00	1.9e+00	9.5e-02	1.3e-03	3.7e-02	2.4e-01	3.6e-01
Th-232	8.1e-01	1.1e-02	3.1e-01	2.1e+00	3.1e+00	1.6e-01	2.2e-03	6.2e-02	4.1e-01	6.1e-01
Pa-231	1.2e+00	1.6e-02	4.5e-01	3.0e+00	4.4e+00	2.3e-01	3.1e-03	8.8e-02	5.8e-01	8.6e-01
U-232	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.1e+00	3.6e-01	5.0e-03	1.4e-01	9.2e-01	1.4e+00
U-233	4.8e-01	6.4e-03	1.8e-01	1.2e+00	1.8e+00	9.2e-02	1.3e-03	3.5e-02	2.3e-01	3.5e-01
U-234	4.6e-01	6.3e-03	1.8e-01	1.2e+00	1.8e+00	9.0e-02	1.2e-03	3.5e-02	2.3e-01	3.4e-01
U-235	4.1e-01	5.7e-03	1.6e-01	1.1e+00	1.6e+00	8.1e-02	1.1e-03	3.1e-02	2.1e-01	3.1e-01
U-236	4.2e-01	5.9e-03	1.6e-01	1.1e+00	1.6e+00	8.4e-02	1.2e-03	3.2e-02	2.1e-01	3.2e-01
U-238	3.8e-01	5.3e-03	1.5e-01	9.9e-01	1.5e+00	7.6e-02	1.0e-03	2.9e-02	1.9e-01	2.9e-01
Np-237	1.0e+00	1.4e-02	3.9e-01	2.6e+00	3.9e+00	2.0e-01	2.8e-03	7.7e-02	5.1e-01	7.5e-01
Pu-236	4.9e-01	6.8e-03	1.9e-01	1.3e+00	1.9e+00	9.6e-02	1.3e-03	3.7e-02	2.5e-01	3.6e-01
Pu-238	7.4e-01	1.0e-02	2.8e-01	1.9e+00	2.9e+00	1.5e-01	2.0e-03	5.6e-02	3.7e-01	5.5e-01
Pu-239	5.6e-01	7.7e-03	2.1e-01	1.4e+00	2.2e+00	1.1e-01	1.5e-03	4.3e-02	2.8e-01	4.2e-01
Pu-240	5.6e-01	7.7e-03	2.1e-01	1.4e+00	2.2e+00	1.1e-01	1.5e-03	4.3e-02	2.8e-01	4.2e-01
Pu-241	5.9e-03	8.2e-05	2.3e-03	1.5e-02	2.3e-02	1.2e-03	1.6e-05	4.5e-04	3.0e-03	4.4e-03
Pu-242	5.2e-01	7.2e-03	2.0e-01	1.3e+00	2.0e+00	1.0e-01	1.4e-03	4.0e-02	2.6e-01	3.9e-01
Pu-244	5.0e-01	6.9e-03	1.9e-01	1.3e+00	1.9e+00	9.8e-02	1.4e-03	3.8e-02	2.5e-01	3.7e-01
Am-241	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.0e+00	3.6e-01	4.9e-03	1.4e-01	9.2e-01	1.4e+00
Am-242m	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.0e+00	3.6e-01	5.0e-03	1.4e-01	9.2e-01	1.4e+00
Am-243	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.0e+00	3.6e-01	4.9e-03	1.4e-01	9.2e-01	1.4e+00
Cm-242	2.1e-01	3.0e-03	8.2e-02	5.5e-01	8.1e-01	4.2e-02	5.9e-04	1.6e-02	1.1e-01	1.6e-01
Cm-243	1.3e+00	1.9e-02	5.2e-01	3.5e+00	5.2e+00	2.6e-01	3.7e-03	1.0e-01	6.8e-01	1.0e+00
Cm-244	1.1e+00	1.6e-02	4.4e-01	2.9e+00	4.4e+00	2.2e-01	3.1e-03	8.7e-02	5.7e-01	8.5e-01
Cm-245	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.0e+00	3.6e-01	5.0e-03	1.4e-01	9.1e-01	1.4e+00
Cm-246	1.8e+00	2.5e-02	7.0e-01	4.7e+00	7.0e+00	3.6e-01	5.0e-03	1.4e-01	9.1e-01	1.4e+00
Cm-247	1.7e+00	2.3e-02	6.5e-01	4.3e+00	6.5e+00	3.3e-01	4.6e-03	1.3e-01	8.5e-01	1.3e+00
Cm-248	6.4e+00	8.8e-02	2.5e+00	1.6e+01	2.5e+01	1.3e+00	1.7e-02	4.9e-01	3.2e+00	4.8e+00
Bk-249	6.8e-03	9.4e-05	2.6e-03	1.7e-02	2.6e-02	1.3e-03	1.8e-05	5.2e-04	3.4e-03	5.1e-03
Cf-248	3.8e-01	5.3e-03	1.5e-01	1.0e+00	1.5e+00	7.6e-02	1.0e-03	2.9e-02	1.9e-01	2.9e-01
Cf-249	3.0e+00	4.2e-02	1.2e+00	7.8e+00	1.2e+01	6.0e-01	8.3e-03	2.3e-01	1.5e+00	2.2e+00
Cf-250	1.5e+00	2.0e-02	5.7e-01	3.8e+00	5.7e+00	2.9e-01	4.0e-03	1.1e-01	7.4e-01	1.1e+00
Cf-251	3.1e+00	4.3e-02	1.2e+00	8.0e+00	1.2e+01	6.1e-01	8.4e-03	2.4e-01	1.6e+00	2.3e+00
Cf-252	8.5e-01	1.2e-02	3.3e-01	2.2e+00	3.3e+00	1.7e-01	2.3e-03	6.5e-02	4.3e-01	6.3e-01
Cf-254	9.9e-01	1.3e-02	3.8e-01	2.5e+00	3.8e+00	2.0e-01	2.6e-03	7.5e-02	5.1e-01	7.4e-01
Es-254	3.8e-01	5.2e-03	1.4e-01	9.7e-01	1.4e+00	7.4e-02	1.0e-03	2.9e-02	1.9e-01	2.8e-01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.58 Normalized effective doses from ingestion: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	3.1e-04	1.8e-06	9.1e-05	8.6e-04	1.4e-03	6.1e-05	3.5e-07	1.8e-05	1.7e-04	2.7e-04
P-32	9.1e-05	4.0e-07	2.1e-05	2.2e-04	4.0e-04	1.8e-05	8.2e-08	4.3e-06	4.4e-05	7.9e-05
S-35	2.1e-05	1.5e-07	6.3e-06	5.7e-05	8.8e-05	4.2e-06	2.9e-08	1.2e-06	1.1e-05	1.7e-05
Cl-36	5.1e-05	2.7e-07	1.3e-05	1.3e-04	2.2e-04	1.0e-05	5.4e-08	2.7e-06	2.7e-05	4.3e-05
K-40	8.2e-04	3.8e-06	1.8e-04	1.7e-03	2.7e-03	1.2e-04	7.6e-07	3.5e-05	3.4e-04	5.4e-04
Ca-41	6.5e-05	4.6e-07	1.9e-05	1.7e-04	2.7e-04	1.3e-05	9.1e-08	3.8e-06	3.5e-05	5.3e-05
Ca-45	1.5e-04	1.0e-06	4.4e-05	3.9e-04	6.1e-04	2.9e-05	2.0e-07	8.6e-06	7.8e-05	1.2e-04
Sc-46	2.5e-04	1.7e-06	7.5e-05	6.8e-04	1.0e-03	4.9e-05	3.5e-07	1.5e-05	1.3e-04	2.0e-04
Cr-51	8.9e-07	0.0e+00	1.2e-07	2.4e-06	4.3e-06	1.8e-07	0.0e+00	2.4e-08	4.7e-07	8.4e-07
Mn-53	4.4e-06	5.6e-09	8.9e-07	1.3e-05	2.1e-05	8.6e-07	1.1e-09	1.8e-07	2.5e-06	4.1e-06
Mn-54	9.6e-05	1.2e-07	1.9e-05	2.8e-04	4.5e-04	1.9e-05	2.4e-08	3.9e-06	5.5e-05	9.0e-05
Fe-55	1.4e-06	0.0e+00	2.2e-07	3.9e-06	6.6e-06	2.7e-07	0.0e+00	4.3e-08	7.6e-07	1.3e-06
Fe-59	4.4e-06	0.0e+00	6.5e-07	1.2e-05	2.1e-05	8.7e-07	0.0e+00	1.4e-07	2.5e-06	4.2e-06
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	8.6e-05	5.9e-07	2.5e-05	2.3e-04	3.6e-04	1.7e-05	1.2e-07	5.1e-06	4.5e-05	7.0e-05
Sr-89	3.6e-04	2.5e-06	1.1e-04	9.6e-04	1.5e-03	7.1e-05	4.8e-07	2.1e-05	1.9e-04	2.9e-04
Sr-90	6.8e-03	4.8e-05	2.0e-03	1.8e-02	2.9e-02	1.3e-03	9.6e-06	4.0e-04	3.7e-03	5.6e-03
Y-91	3.5e-04	2.4e-06	1.1e-04	9.5e-04	1.5e-03	7.0e-05	4.8e-07	2.1e-05	1.9e-04	2.9e-04
Zr-93	8.3e-05	4.4e-07	1.9e-05	1.7e-04	2.6e-04	1.2e-05	8.8e-08	3.7e-06	3.4e-05	5.1e-05
Zr-95	1.9e-04	1.3e-06	5.6e-05	5.0e-04	7.8e-04	3.7e-05	2.5e-07	1.1e-05	1.0e-04	1.5e-04
Nb-93m	2.7e-05	1.9e-07	8.0e-06	7.2e-05	1.1e-04	5.3e-06	3.7e-08	1.6e-06	1.4e-05	2.2e-05
Nb-94	3.8e-04	2.7e-06	1.1e-04	1.0e-03	1.6e-03	7.5e-05	5.3e-07	2.2e-05	2.0e-04	3.1e-04
Nb-95	6.6e-05	4.2e-07	1.9e-05	1.7e-04	2.7e-04	1.3e-05	8.5e-08	3.8e-06	3.4e-05	5.4e-05
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	8.0e-06	0.0e+00	1.1e-06	2.2e-05	4.0e-05	1.6e-06	0.0e+00	2.2e-07	4.3e-06	7.8e-06
Sb-125	6.1e-06	0.0e+00	8.6e-07	1.7e-05	3.0e-05	1.2e-06	0.0e+00	1.7e-07	3.3e-06	5.9e-06
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	5.5e-04	2.9e-06	1.4e-04	1.4e-03	2.4e-03	1.1e-04	5.6e-07	2.7e-05	2.8e-04	4.7e-04
I-129	8.0e-03	3.2e-05	1.5e-03	1.6e-02	2.6e-02	1.2e-03	6.4e-06	3.0e-04	3.1e-03	5.1e-03
I-131	1.0e-04	1.7e-07	1.3e-05	2.4e-04	4.6e-04	2.0e-05	3.3e-08	2.6e-06	4.7e-05	9.3e-05
Cs-134	3.7e-04	7.2e-07	3.9e-05	5.9e-04	1.4e-03	7.4e-05	1.4e-07	7.8e-06	1.2e-04	2.8e-04
Cs-135	4.1e-05	7.7e-08	4.2e-06	8.5e-05	1.5e-04	8.1e-06	1.5e-08	8.5e-07	1.3e-05	3.0e-05
Cs-137	2.6e-04	5.0e-07	2.7e-05	4.2e-04	9.9e-04	5.2e-05	9.9e-08	5.5e-06	8.3e-05	2.0e-04
Ba-133	2.2e-04	1.6e-06	8.7e-05	8.0e-04	9.3e-04	4.4e-05	3.1e-07	1.3e-05	1.2e-04	1.8e-04
Ce-139	4.8e-05	3.4e-07	1.5e-05	1.3e-04	2.0e-04	9.6e-06	6.6e-08	2.9e-06	2.6e-05	4.0e-05
Ce-141	7.7e-05	4.9e-07	2.2e-05	2.0e-04	3.2e-04	1.5e-05	9.7e-08	4.5e-06	4.0e-05	6.3e-05
Ce-144	1.1e-03	7.6e-06	3.2e-04	2.9e-03	4.5e-03	2.1e-04	1.5e-06	6.3e-05	5.8e-04	8.9e-04
Pm-147	5.6e-05	4.0e-07	1.7e-05	1.5e-04	2.4e-04	1.1e-05	7.9e-08	3.3e-06	3.0e-05	4.6e-05

Table F2.58 Normalized effective doses from ingestion: Slag disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	2.2e-05	1.5e-07	6.5e-06	5.9e-05	9.1e-05	4.3e-06	3.1e-08	1.3e-06	1.2e-05	1.8e-05
Eu-152	3.1e-04	2.2e-06	9.3e-05	8.4e-04	1.3e-03	6.1e-05	4.3e-07	1.8e-05	1.7e-04	2.5e-04
Eu-154	4.4e-04	3.1e-06	1.3e-04	1.2e-03	1.8e-03	8.7e-05	6.2e-07	2.6e-05	2.4e-04	3.6e-04
Eu-155	7.0e-05	4.9e-07	2.1e-05	1.9e-04	2.9e-04	1.4e-05	9.8e-08	4.2e-06	3.8e-05	5.8e-05
Gd-153	5.4e-05	3.8e-07	1.6e-05	1.5e-04	2.3e-04	1.1e-05	7.6e-08	3.2e-06	2.9e-05	4.5e-05
Tb-160	2.5e-04	1.8e-06	7.6e-05	6.8e-04	1.1e-03	5.0e-05	3.5e-07	1.5e-05	1.3e-04	2.1e-04
Tm-170	2.4e-04	1.7e-06	7.2e-05	6.5e-04	1.0e-03	4.7e-05	3.3e-07	1.4e-05	1.3e-04	2.0e-04
Tm-171	2.4e-05	1.7e-07	7.1e-06	6.4e-05	9.9e-05	4.7e-06	3.3e-08	1.4e-06	1.3e-05	2.0e-05
Ta-182	2.7e-04	1.9e-06	8.1e-05	7.3e-04	1.1e-03	5.3e-05	3.7e-07	1.6e-05	1.4e-04	2.2e-04
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Re-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	6.3e-02	4.4e-04	1.9e-02	1.7e-01	2.6e-01	1.2e-02	8.9e-05	3.7e-03	3.4e-02	5.2e-02
Ra-228	1.5e-01	1.0e-03	4.5e-02	4.0e-01	6.2e-01	2.9e-02	2.1e-04	8.7e-03	8.0e-02	1.2e-01
Ac-227	2.7e-01	1.9e-03	8.1e-02	7.2e-01	1.1e+00	5.3e-02	3.8e-04	1.6e-02	1.4e-01	2.2e-01
Th-228	2.3e-02	1.6e-04	6.9e-03	6.2e-02	9.6e-02	4.5e-03	3.2e-05	1.3e-03	1.2e-02	1.9e-02
Th-229	7.4e-02	5.0e-04	2.1e-02	1.9e-01	3.0e-01	1.4e-02	1.0e-04	4.2e-03	3.8e-02	5.9e-02
Th-230	1.9e-02	1.4e-04	5.8e-03	5.2e-02	8.1e-02	3.8e-03	2.7e-05	1.1e-03	1.0e-02	1.6e-02
Th-232	2.2e-02	1.6e-04	6.7e-03	6.0e-02	9.3e-02	4.4e-03	3.1e-05	1.3e-03	1.2e-02	1.8e-02
Pa-231	1.6e-01	1.1e-03	4.8e-02	4.3e-01	6.7e-01	3.1e-02	2.2e-04	9.4e-03	8.6e-02	1.3e-01
U-232	9.1e-03	6.3e-05	2.7e-03	2.5e-02	3.8e-02	1.8e-03	1.3e-05	5.3e-04	4.9e-03	7.4e-03
U-233	1.9e-03	1.3e-05	5.7e-04	5.1e-03	7.9e-03	3.7e-04	2.7e-06	1.1e-04	1.0e-03	1.6e-03
U-234	1.8e-03	1.3e-05	5.6e-04	5.0e-03	7.7e-03	3.7e-04	2.6e-06	1.1e-04	9.9e-04	1.5e-03
U-235	1.9e-03	1.4e-05	5.8e-04	5.2e-03	8.0e-03	3.8e-04	2.7e-06	1.1e-04	1.0e-03	1.6e-03
U-236	1.8e-03	1.2e-05	5.3e-04	4.7e-03	7.4e-03	3.5e-04	2.5e-06	1.0e-04	9.5e-04	1.4e-03
U-238	2.5e-03	1.7e-05	7.4e-04	6.6e-03	1.0e-02	4.8e-04	3.4e-06	1.4e-04	1.3e-03	2.0e-03
Np-237	2.5e-02	1.7e-04	7.4e-03	6.7e-02	1.0e-01	4.9e-03	3.5e-05	1.5e-03	1.3e-02	2.0e-02
Pu-236	1.9e-02	1.3e-04	5.6e-03	5.0e-02	7.8e-02	3.7e-03	2.6e-05	1.1e-03	1.0e-02	1.5e-02
Pu-238	5.1e-02	3.6e-04	1.5e-02	1.4e-01	2.1e-01	1.0e-02	7.2e-05	3.0e-03	2.7e-02	4.2e-02
Pu-239	5.6e-02	3.9e-04	1.7e-02	1.5e-01	2.3e-01	1.1e-02	7.8e-05	3.3e-03	3.0e-02	4.6e-02
Pu-240	5.6e-02	3.9e-04	1.7e-02	1.5e-01	2.3e-01	1.1e-02	7.8e-05	3.3e-03	3.0e-02	4.6e-02
Pu-241	1.0e-03	7.4e-06	3.1e-04	2.8e-03	4.4e-03	2.1e-04	1.5e-06	6.2e-05	5.6e-04	8.6e-04
Pu-242	5.4e-02	3.8e-04	1.6e-02	1.4e-01	2.2e-01	1.1e-02	7.5e-05	3.1e-03	2.9e-02	4.4e-02
Pu-244	5.4e-02	3.8e-04	1.6e-02	1.5e-01	2.3e-01	1.1e-02	7.5e-05	3.2e-03	2.9e-02	4.4e-02
Am-241	4.5e-02	3.2e-04	1.3e-02	1.2e-01	1.9e-01	8.8e-03	6.2e-05	2.6e-03	2.4e-02	3.7e-02
Am-242m	4.5e-02	3.2e-04	1.3e-02	1.2e-01	1.9e-01	8.8e-03	6.3e-05	2.6e-03	2.4e-02	3.7e-02
Am-243	4.5e-02	3.2e-04	1.3e-02	1.2e-01	1.9e-01	8.8e-03	6.3e-05	2.6e-03	2.4e-02	3.7e-02
Cm-242	2.3e-03	1.6e-05	7.0e-04	6.3e-03	9.7e-03	4.6e-04	3.2e-06	1.4e-04	1.3e-03	1.9e-03
Cm-243	3.3e-02	2.4e-04	1.0e-02	9.0e-02	1.4e-01	6.6e-03	4.7e-05	2.0e-03	1.8e-02	2.8e-02
Cm-244	2.7e-02	1.9e-04	8.0e-03	7.2e-02	1.1e-01	5.3e-03	3.7e-05	1.6e-03	1.4e-02	2.2e-02
Cm-245	4.7e-02	3.3e-04	1.4e-02	1.3e-01	2.0e-01	9.2e-03	6.6e-05	2.8e-03	2.5e-02	3.9e-02
Cm-246	4.7e-02	3.3e-04	1.4e-02	1.3e-01	2.0e-01	9.2e-03	6.6e-05	2.7e-03	2.5e-02	3.9e-02
Cm-247	4.2e-02	3.0e-04	1.3e-02	1.1e-01	1.8e-01	8.4e-03	5.9e-05	2.5e-03	2.3e-02	3.5e-02
Cm-248	1.7e-01	1.2e-03	5.2e-02	4.6e-01	7.2e-01	3.4e-02	2.4e-04	1.0e-02	9.3e-02	1.4e-01
Bk-249	2.1e-04	1.5e-06	6.4e-05	5.8e-04	9.0e-04	4.2e-05	3.0e-07	1.3e-05	1.2e-04	1.8e-04
Cf-248	5.9e-03	4.2e-05	1.8e-03	1.6e-02	2.5e-02	1.2e-03	8.2e-06	3.5e-04	3.2e-03	4.9e-03
Cf-249	7.8e-02	5.5e-04	2.3e-02	2.1e-01	3.2e-01	1.5e-02	1.1e-04	4.6e-03	4.2e-02	6.5e-02
Cf-250	3.5e-02	2.5e-04	1.1e-02	9.6e-02	1.5e-01	7.0e-03	5.0e-05	2.1e-03	1.9e-02	2.9e-02
Cf-251	8.0e-02	5.7e-04	2.4e-02	2.2e-01	3.3e-01	1.6e-02	1.1e-04	4.7e-03	4.3e-02	6.6e-02
Cf-252	2.0e-02	1.4e-04	5.9e-03	5.3e-02	8.2e-02	3.9e-03	2.7e-05	1.2e-03	1.1e-02	1.6e-02
Cf-254	6.0e-02	4.1e-04	1.8e-02	1.6e-01	2.5e-01	1.2e-02	8.1e-05	3.5e-03	3.1e-02	4.9e-02
Es-254	5.9e-03	4.2e-05	1.8e-03	1.6e-02	2.5e-02	1.2e-03	8.3e-06	3.5e-04	3.2e-03	4.9e-03

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.59 Normalized effective doses from all pathways: Scrap disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	2.7e-05	1.5e-06	1.2e-05	7.3e-05	1.1e-04	5.3e-06	3.0e-07	2.3e-06	1.5e-05	2.2e-05
Na-22	3.2e+01	1.7e+00	1.4e+01	8.5e+01	1.3e+02	6.2e+00	3.4e-01	2.7e+00	1.7e+01	2.6e+01
P-32	4.0e-02	2.2e-03	1.7e-02	1.1e-01	1.7e-01	8.0e-03	4.3e-04	3.5e-03	2.1e-02	3.3e-02
S-35	2.9e-05	1.6e-06	1.3e-05	7.8e-05	1.2e-04	5.7e-06	3.2e-07	2.5e-06	1.6e-05	2.4e-05
Cl-36	6.1e-03	3.3e-04	2.6e-03	1.6e-02	2.5e-02	1.2e-03	6.7e-05	5.2e-04	3.3e-03	5.0e-03
K-40	2.5e+00	1.3e-01	1.1e+00	6.6e+00	1.0e+01	4.8e-01	2.7e-02	2.1e-01	1.3e+00	2.0e+00
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	1.3e-04	6.9e-06	5.6e-05	3.5e-04	5.4e-04	2.5e-05	1.4e-06	1.1e-05	6.9e-05	1.1e-04
Sc-46	2.8e+01	1.5e+00	1.2e+01	7.7e+01	1.2e+02	5.6e+00	3.1e-01	2.4e+00	1.5e+01	2.3e+01
Cr-51	3.6e-01	1.9e-02	1.5e-01	9.5e-01	1.5e+00	7.0e-02	3.9e-03	3.1e-02	1.9e-01	2.9e-01
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.2e+01	6.4e-01	5.1e+00	3.2e+01	4.9e+01	2.3e+00	1.3e-01	1.0e+00	6.4e+00	9.7e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.7e+01	8.9e-01	7.2e+00	4.5e+01	6.9e+01	3.3e+00	1.8e-01	1.4e+00	8.9e+00	1.4e+01
Co-56	5.3e+01	2.8e+00	2.3e+01	1.4e+02	2.2e+02	1.0e+01	5.8e-01	4.6e+00	2.8e+01	4.4e+01
Co-57	1.1e+00	6.0e-02	4.8e-01	3.0e+00	4.6e+00	2.2e-01	1.2e-02	9.5e-02	6.0e-01	9.1e-01
Co-58	1.3e+01	7.1e-01	5.7e+00	3.5e+01	5.5e+01	2.6e+00	1.4e-01	1.1e+00	7.1e+00	1.1e+01
Co-60	3.8e+01	2.0e+00	1.6e+01	1.0e+02	1.6e+02	7.4e+00	4.1e-01	3.2e+00	2.0e+01	3.1e+01
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	8.5e+00	4.6e-01	3.7e+00	2.3e+01	3.5e+01	1.7e+00	9.3e-02	7.3e-01	4.6e+00	7.0e+00
As-73	1.9e-02	1.0e-03	8.1e-03	5.0e-02	7.8e-02	3.7e-03	2.0e-04	1.6e-03	1.0e-02	1.5e-02
Se-75	4.4e+00	2.4e-01	1.9e+00	1.2e+01	1.8e+01	8.6e-01	4.8e-02	3.8e-01	2.4e+00	3.6e+00
Sr-85	6.5e+00	3.5e-01	2.8e+00	1.7e+01	2.7e+01	1.3e+00	7.1e-02	5.6e-01	3.5e+00	5.3e+00
Sr-89	3.5e-02	1.9e-03	1.5e-02	9.4e-02	1.5e-01	6.9e-03	3.8e-04	3.0e-03	1.9e-02	2.9e-02
Sr-90	1.0e-01	5.4e-03	4.3e-02	2.7e-01	4.2e-01	2.0e-02	1.1e-03	8.6e-03	5.4e-02	8.3e-02
Y-91	8.9e-02	4.8e-03	3.8e-02	2.4e-01	3.7e-01	1.7e-02	9.6e-04	7.6e-03	4.8e-02	7.3e-02
Zr-93	9.1e-08	3.9e-09	3.6e-08	2.3e-07	3.8e-07	1.8e-08	7.8e-10	7.0e-09	4.6e-08	7.6e-08
Zr-95	1.1e+01	5.8e-01	4.7e+00	2.9e+01	4.5e+01	2.1e+00	1.2e-01	9.2e-01	5.8e+00	8.9e+00
Nb-93m	1.8e-04	9.7e-06	7.8e-05	4.9e-04	7.5e-04	3.6e-05	2.0e-06	1.5e-05	9.7e-05	1.5e-04
Nb-94	2.2e+01	1.2e+00	9.7e+00	6.0e+01	9.3e+01	4.4e+00	2.4e-01	1.9e+00	1.2e+01	1.8e+01
Nb-95	1.0e+01	5.3e-01	4.3e+00	2.7e+01	4.2e+01	2.0e+00	1.1e-01	8.6e-01	5.4e+00	8.2e+00
Mo-93	1.0e-03	5.5e-05	4.4e-04	2.8e-03	4.3e-03	2.0e-04	1.1e-05	8.7e-05	5.5e-04	8.4e-04
Tc-97	1.4e-03	7.5e-05	6.0e-04	3.7e-03	5.8e-03	2.7e-04	1.5e-05	1.2e-04	7.4e-04	1.1e-03
Tc-97m	3.6e-03	2.0e-04	1.6e-03	9.8e-03	1.5e-02	7.2e-04	4.0e-05	3.1e-04	2.0e-03	3.0e-03
Tc-99	2.7e-04	1.4e-05	1.2e-04	7.2e-04	1.1e-03	5.3e-05	2.9e-06	2.3e-05	1.4e-04	2.2e-04
Ru-103	5.8e+00	3.1e-01	2.5e+00	1.6e+01	2.4e+01	1.1e+00	6.3e-02	5.0e-01	3.1e+00	4.8e+00
Ru-106	3.0e+00	1.6e-01	1.3e+00	8.2e+00	1.3e+01	6.0e-01	3.3e-02	2.6e-01	1.6e+00	2.5e+00
Ag-108m	2.2e+01	1.2e+00	9.5e+00	6.0e+01	9.2e+01	4.4e+00	2.4e-01	1.9e+00	1.2e+01	1.8e+01
Ag-110m	3.9e+01	2.1e+00	1.7e+01	1.1e+02	1.6e+02	7.8e+00	4.3e-01	3.4e+00	2.1e+01	3.2e+01
Cd-109	5.5e-02	3.0e-03	2.4e-02	1.5e-01	2.3e-01	1.1e-02	6.0e-04	4.7e-03	3.0e-02	4.5e-02
Sn-113	3.3e+00	1.7e-01	1.4e+00	8.8e+00	1.4e+01	6.4e-01	3.5e-02	2.8e-01	1.7e+00	2.7e+00
Sb-124	2.6e+01	1.4e+00	1.1e+01	6.9e+01	1.1e+02	5.1e+00	2.8e-01	2.2e+00	1.4e+01	2.1e+01
Sb-125	5.6e+00	3.0e-01	2.4e+00	1.5e+01	2.3e+01	1.1e+00	6.1e-02	4.8e-01	3.0e+00	4.6e+00
Te-123m	1.4e+00	7.4e-02	5.9e-01	3.7e+00	5.7e+00	2.7e-01	1.5e-02	1.2e-01	7.4e-01	1.1e+00
Te-127m	7.2e-02	3.9e-03	3.1e-02	1.9e-01	3.0e-01	1.4e-02	7.9e-04	6.2e-03	3.9e-02	5.9e-02
I-125	2.8e-02	1.5e-03	1.2e-02	7.5e-02	1.2e-01	5.5e-03	3.0e-04	2.4e-03	1.5e-02	2.3e-02
I-129	2.4e-02	1.3e-03	1.0e-02	6.4e-02	9.8e-02	4.7e-03	2.6e-04	2.0e-03	1.3e-02	1.9e-02
I-131	3.4e+00	1.8e-01	1.4e+00	9.0e+00	1.4e+01	6.7e-01	3.6e-02	2.9e-01	1.8e+00	2.8e+00
Cs-134	2.2e+01	1.2e+00	9.4e+00	5.9e+01	9.0e+01	4.3e+00	2.4e-01	1.9e+00	1.2e+01	1.8e+01
Cs-135	7.9e-05	4.3e-06	3.4e-05	2.1e-04	3.3e-04	1.6e-05	8.6e-07	6.7e-06	4.2e-05	6.5e-05
Cs-137	7.9e+00	4.2e-01	3.4e+00	2.1e+01	3.3e+01	1.5e+00	8.6e-02	6.7e-01	4.2e+00	6.5e+00
Ba-133	4.5e+00	2.4e-01	1.9e+00	1.2e+01	1.9e+01	8.8e-01	4.9e-02	3.8e-01	2.4e+00	3.7e+00
Ce-139	1.4e+00	7.5e-02	6.0e-01	3.8e+00	5.8e+00	2.8e-01	1.5e-02	1.2e-01	7.5e-01	1.1e+00
Ce-141	8.5e-01	3.5e-02	2.8e-01	1.7e+00	2.7e+00	1.3e-01	7.0e-03	5.6e-02	3.5e-01	5.3e-01
Ce-144	8.0e-01	4.3e-02	3.5e-01	2.2e+00	3.3e+00	1.6e-01	8.7e-03	6.8e-02	4.3e-01	6.6e-01
Pm-147	1.1e-04	5.7e-06	4.6e-05	2.8e-04	4.4e-04	2.1e-05	1.1e-06	9.0e-06	5.7e-05	8.7e-05

Table F2.59 Normalized effective doses from all pathways: Scrap disposal–Industrial

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-06	8.9e-08	7.2e-07	4.5e-06	6.9e-06	3.3e-07	1.8e-08	1.4e-07	8.9e-07	1.4e-06
Eu-152	1.6e+01	8.7e-01	7.0e+00	4.4e+01	6.8e+01	3.2e+00	1.8e-01	1.4e+00	8.7e+00	1.3e+01
Eu-154	1.8e+01	9.6e-01	7.7e+00	4.8e+01	7.4e+01	3.5e+00	1.9e-01	1.5e+00	9.6e+00	1.5e+01
Eu-155	4.0e-01	2.1e-02	1.7e-01	1.1e+00	1.7e+00	7.8e-02	4.3e-03	3.4e-02	2.1e-01	3.3e-01
Gd-153	5.2e-01	2.8e-02	2.2e-01	1.4e+00	2.1e+00	1.0e-01	5.6e-03	4.4e-02	2.8e-01	4.3e-01
Tb-160	1.5e+01	8.3e-01	6.7e+00	4.1e+01	6.4e+01	3.0e+00	1.7e-01	1.3e+00	8.3e+00	1.3e+01
Tm-170	3.4e-02	1.8e-03	1.5e-02	9.1e-02	1.4e-01	6.7e-03	3.7e-04	2.9e-03	1.8e-02	2.8e-02
Tm-171	2.3e-03	1.2e-04	1.0e-03	6.2e-03	9.6e-03	4.5e-04	2.5e-05	2.0e-04	1.2e-03	1.9e-03
Ta-182	1.8e+01	9.7e-01	7.8e+00	4.8e+01	7.5e+01	3.5e+00	2.0e-01	1.5e+00	9.7e+00	1.5e+01
W-181	1.6e-01	8.4e-03	6.8e-02	4.2e-01	6.5e-01	3.1e-02	1.7e-03	1.3e-02	8.4e-02	1.3e-01
W-185	9.0e-04	4.9e-05	3.9e-04	2.4e-03	3.8e-03	1.8e-04	9.8e-06	7.8e-05	4.9e-04	7.4e-04
Re-185	9.3e+00	5.0e-01	4.0e+00	2.5e+01	3.9e+01	1.8e+00	1.0e-01	8.0e-01	5.0e+00	7.6e+00
Ir-192	1.0e+01	5.4e-01	4.4e+00	2.7e+01	4.2e+01	2.0e+00	1.1e-01	8.7e-01	5.4e+00	8.3e+00
Tl-204	9.5e-03	5.1e-04	4.1e-03	2.6e-02	4.0e-02	1.9e-03	1.0e-04	8.1e-04	5.1e-03	7.9e-03
Pb-210	1.8e-02	9.9e-04	8.0e-03	5.0e-02	7.6e-02	3.6e-03	2.0e-04	1.6e-03	9.9e-03	1.5e-02
Bi-207	2.2e+01	1.2e+00	9.4e+00	5.8e+01	9.0e+01	4.3e+00	2.4e-01	1.9e+00	1.2e+01	1.8e+01
Po-210	1.2e-04	6.4e-06	5.1e-05	3.2e-04	4.9e-04	2.3e-05	1.3e-06	1.0e-05	6.4e-05	9.8e-05
Ra-226	2.6e+01	1.4e+00	1.1e+01	7.0e+01	1.1e+02	5.1e+00	2.8e-01	2.2e+00	1.4e+01	2.1e+01
Ra-228	1.4e+01	7.5e-01	6.1e+00	3.8e+01	5.8e+01	2.8e+00	1.5e-01	1.2e+00	7.5e+00	1.2e+01
Ac-227	4.6e+00	2.5e-01	2.0e+00	1.2e+01	1.9e+01	9.0e-01	5.0e-02	3.9e-01	2.5e+00	3.8e+00
Th-228	2.4e+01	1.3e+00	1.0e+01	6.4e+01	9.8e+01	4.7e+00	2.6e-01	2.0e+00	1.3e+01	2.0e+01
Th-229	8.6e+00	1.9e-01	1.6e+00	9.7e+00	1.5e+01	7.1e-01	3.9e-02	3.1e-01	1.9e+00	3.0e+00
Th-230	2.8e-03	1.5e-04	1.2e-03	7.5e-03	1.2e-02	5.5e-04	3.0e-05	2.4e-04	1.5e-03	2.3e-03
Th-232	2.2e-02	9.7e-04	8.7e-03	5.6e-02	9.1e-02	4.3e-03	1.9e-04	1.7e-03	1.1e-02	1.8e-02
Pa-231	4.4e-01	2.3e-02	1.9e-01	1.2e+00	1.8e+00	8.6e-02	4.6e-03	3.7e-02	2.3e-01	3.6e-01
U-232	1.1e-01	4.7e-03	4.2e-02	2.8e-01	4.5e-01	2.1e-02	9.3e-04	8.4e-03	5.5e-02	9.0e-02
U-233	3.1e-03	1.7e-04	1.3e-03	8.4e-03	1.3e-02	6.1e-04	3.4e-05	2.7e-04	1.7e-03	2.6e-03
U-234	8.5e-04	4.5e-05	3.7e-04	2.3e-03	3.5e-03	1.7e-04	9.2e-06	7.2e-05	4.5e-04	7.0e-04
U-235	1.7e+00	9.1e-02	7.4e-01	4.6e+00	7.1e+00	3.4e-01	1.9e-02	1.4e-01	9.1e-01	1.4e+00
U-236	4.4e-04	2.4e-05	1.9e-04	1.2e-03	1.8e-03	8.6e-05	4.8e-06	3.7e-05	2.3e-04	3.6e-04
U-238	3.4e-01	1.8e-02	1.5e-01	9.1e-01	1.4e+00	6.7e-02	3.7e-03	2.9e-02	1.8e-01	2.8e-01
Np-237	2.5e+00	1.3e-01	1.1e+00	6.7e+00	1.0e+01	4.8e-01	2.7e-02	2.1e-01	1.3e+00	2.1e+00
Pu-236	4.5e-04	2.4e-05	2.0e-04	1.2e-03	1.9e-03	8.9e-05	4.9e-06	3.9e-05	2.4e-04	3.7e-04
Pu-238	2.9e-04	1.5e-05	1.2e-04	7.7e-04	1.2e-03	5.7e-05	3.1e-06	2.4e-05	1.5e-04	2.4e-04
Pu-239	6.5e-04	3.5e-05	2.8e-04	1.7e-03	2.7e-03	1.3e-04	7.1e-06	5.5e-05	3.5e-04	5.3e-04
Pu-240	2.8e-04	1.5e-05	1.2e-04	7.5e-04	1.2e-03	5.5e-05	3.0e-06	2.4e-05	1.5e-04	2.3e-04
Pu-241	1.5e-05	8.0e-07	6.4e-06	4.0e-05	6.2e-05	2.9e-06	1.6e-07	1.3e-06	7.9e-06	1.2e-05
Pu-242	2.4e-04	1.3e-05	1.1e-04	6.6e-04	1.0e-03	4.8e-05	2.7e-06	2.1e-05	1.3e-04	2.0e-04
Pu-244	4.7e+00	2.5e-01	2.0e+00	1.3e+01	2.0e+01	9.3e-01	5.1e-02	4.0e-01	2.5e+00	3.9e+00
Am-241	9.1e-02	4.9e-03	4.0e-02	2.5e-01	3.8e-01	1.8e-02	1.0e-03	7.8e-03	4.9e-02	7.5e-02
Am-242m	1.5e-01	8.1e-03	6.5e-02	4.1e-01	6.3e-01	3.0e-02	1.6e-03	1.3e-02	8.1e-02	1.2e-01
Am-243	2.0e+00	1.1e-01	8.7e-01	5.4e+00	8.3e+00	3.9e-01	2.2e-02	1.7e-01	1.1e+00	1.7e+00
Cm-242	3.1e-04	1.7e-05	1.3e-04	8.4e-04	1.3e-03	6.1e-05	3.4e-06	2.7e-05	1.7e-04	2.6e-04
Cm-243	1.3e+00	7.1e-02	5.7e-01	3.5e+00	5.5e+00	2.6e-01	1.4e-02	1.1e-01	7.0e-01	1.1e+00
Cm-244	2.2e-04	1.2e-05	9.5e-05	5.9e-04	9.2e-04	4.3e-05	2.4e-06	1.9e-05	1.2e-04	1.8e-04
Cm-245	7.5e-01	4.1e-02	3.3e-01	2.0e+00	3.1e+00	1.5e-01	8.2e-03	6.4e-02	4.0e-01	6.2e-01
Cm-246	2.0e-04	1.1e-05	8.8e-05	5.5e-04	8.5e-04	4.0e-05	2.2e-06	1.7e-05	1.1e-04	1.7e-04
Cm-247	4.2e+00	2.3e-01	1.8e+00	1.1e+01	1.8e+01	8.4e-01	4.6e-02	3.6e-01	2.3e+00	3.5e+00
Cm-248	1.5e-04	8.3e-06	6.7e-05	4.1e-04	6.4e-04	3.0e-05	1.7e-06	1.3e-05	8.3e-05	1.3e-04
Bk-249	1.1e-04	5.0e-06	4.4e-05	2.8e-04	4.6e-04	2.2e-05	9.9e-07	8.7e-06	5.6e-05	9.3e-05
Cf-248	2.1e-04	1.2e-05	9.3e-05	5.8e-04	8.9e-04	4.2e-05	2.3e-06	1.8e-05	1.2e-04	1.8e-04
Cf-249	4.2e+00	2.3e-01	1.8e+00	1.1e+01	1.8e+01	8.3e-01	4.6e-02	3.6e-01	2.3e+00	3.5e+00
Cf-250	2.0e-04	1.1e-05	8.8e-05	5.5e-04	8.5e-04	4.0e-05	2.2e-06	1.7e-05	1.1e-04	1.7e-04
Cf-251	1.2e+00	6.4e-02	5.1e-01	3.2e+00	4.9e+00	2.3e-01	1.3e-02	1.0e-01	6.3e-01	9.7e-01
Cf-252	3.3e-04	1.8e-05	1.4e-04	9.0e-04	1.4e-03	6.6e-05	3.6e-06	2.8e-05	1.8e-04	2.8e-04
Cf-254	6.3e-07	3.4e-08	2.7e-07	1.7e-06	2.6e-06	1.2e-07	6.9e-09	5.4e-08	3.4e-07	5.2e-07
Es-254	1.3e+01	6.9e-01	5.5e+00	3.4e+01	5.3e+01	2.5e+00	1.4e-01	1.1e+00	6.9e+00	1.1e+01

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.60 Normalized effective doses from all pathways: Scrap disposal–municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	9.2e-06	8.4e-08	2.7e-06	2.1e-05	3.5e-05	1.8e-06	1.7e-08	5.3e-07	4.2e-06	7.1e-06
Na-22	1.1e+01	9.8e-02	3.1e+00	2.4e+01	4.1e+01	2.1e+00	1.9e-02	6.2e-01	4.8e+00	8.3e+00
P-32	1.4e-02	1.3e-04	4.0e-03	3.2e-02	5.3e-02	2.7e-03	2.5e-05	7.9e-04	6.2e-03	1.1e-02
S-35	9.9e-06	9.1e-08	2.9e-06	2.2e-05	3.8e-05	2.0e-06	1.8e-08	5.7e-07	4.5e-06	7.6e-06
Cl-36	2.1e-03	1.9e-05	6.1e-04	4.7e-03	8.0e-03	4.1e-04	3.8e-06	1.2e-04	9.4e-04	1.6e-03
K-40	8.3e-01	7.6e-03	2.4e-01	1.9e+00	3.2e+00	1.6e-01	1.5e-03	4.8e-02	3.8e-01	6.4e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	4.4e-05	4.0e-07	1.3e-05	9.9e-05	1.7e-04	8.6e-06	8.0e-08	2.5e-06	2.0e-05	3.4e-05
Sc-46	9.7e+00	8.8e-02	2.8e+00	2.2e+01	3.7e+01	1.9e+00	1.8e-02	5.5e-01	4.4e+00	7.4e+00
Cr-51	1.2e-01	1.1e-03	3.6e-02	2.8e-01	4.7e-01	2.4e-02	2.2e-04	6.9e-03	5.5e-02	9.3e-02
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	4.0e+00	3.7e-02	1.2e+00	9.1e+00	1.5e+01	7.9e-01	7.3e-03	2.3e-01	1.8e+00	3.1e+00
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	5.7e+00	5.2e-02	1.7e+00	1.3e+01	2.2e+01	1.1e+00	1.0e-02	3.2e-01	2.6e+00	4.3e+00
Co-56	1.8e+01	1.7e-01	5.3e+00	4.1e+01	6.9e+01	3.6e+00	3.3e-02	1.0e+00	8.2e+00	1.4e+01
Co-57	3.8e-01	3.4e-03	1.1e-01	8.5e-01	1.4e+00	7.4e-02	6.8e-04	2.2e-02	1.7e-01	2.9e-01
Co-58	4.5e+00	4.1e-02	1.3e+00	1.0e+01	1.7e+01	8.9e-01	8.2e-03	2.6e-01	2.0e+00	3.4e+00
Co-60	1.3e+01	1.2e-01	3.8e+00	2.9e+01	4.9e+01	2.5e+00	2.3e-02	7.4e-01	5.8e+00	9.9e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	2.9e+00	2.7e-02	8.5e-01	6.6e+00	1.1e+01	5.7e-01	5.3e-03	1.7e-01	1.3e+00	2.2e+00
As-73	8.3e-03	5.8e-05	1.9e-03	1.4e-02	2.4e-02	1.2e-03	1.2e-05	3.6e-04	2.9e-03	4.8e-03
Se-75	1.5e+00	1.4e-02	4.4e-01	3.4e+00	5.7e+00	2.9e-01	2.7e-03	8.6e-02	6.7e-01	1.1e+00
Sr-85	2.2e+00	2.0e-02	6.5e-01	5.0e+00	8.5e+00	4.4e-01	4.0e-03	1.3e-01	1.0e+00	1.7e+00
Sr-89	1.2e-02	1.1e-04	3.5e-03	2.7e-02	4.6e-02	2.3e-03	2.2e-05	6.8e-04	5.4e-03	9.1e-03
Sr-90	3.4e-02	3.1e-04	1.0e-02	7.7e-02	1.3e-01	6.7e-03	6.2e-05	2.0e-03	1.5e-02	2.6e-02
Y-91	3.0e-02	2.8e-04	8.8e-03	6.8e-02	1.2e-01	5.9e-03	5.5e-05	1.7e-03	1.4e-02	2.3e-02
Zr-93	3.0e-08	2.4e-10	8.5e-09	7.1e-08	1.2e-07	5.9e-09	4.8e-11	1.7e-09	1.4e-08	2.3e-08
Zr-95	3.7e+00	3.4e-02	1.1e+00	8.3e+00	1.4e+01	7.3e-01	6.7e-03	2.1e-01	1.7e+00	2.8e+00
Nb-93m	8.2e-05	5.6e-07	1.8e-05	1.4e-04	2.4e-04	1.2e-05	1.1e-07	3.5e-06	2.8e-05	4.7e-05
Nb-94	7.6e+00	7.0e-02	2.2e+00	1.7e+01	2.9e+01	1.5e+00	1.4e-02	4.4e-01	3.4e+00	5.9e+00
Nb-95	3.4e+00	3.1e-02	9.9e-01	7.7e+00	1.3e+01	6.7e-01	6.2e-03	1.9e-01	1.5e+00	2.6e+00
Mo-93	3.5e-04	3.2e-06	1.0e-04	7.9e-04	1.3e-03	6.9e-05	6.3e-07	2.0e-05	1.6e-04	2.7e-04
Tc-97	4.7e-04	4.3e-06	1.4e-04	1.1e-03	1.8e-03	9.3e-05	8.5e-07	2.7e-05	2.1e-04	3.6e-04
Tc-97m	1.2e-03	1.1e-05	3.6e-04	2.8e-03	4.8e-03	2.4e-04	2.3e-06	7.1e-05	5.6e-04	9.5e-04
Tc-99	9.1e-05	8.3e-07	2.7e-05	2.0e-04	3.5e-04	1.8e-05	1.6e-07	5.2e-06	4.1e-05	7.0e-05
Ru-103	2.0e+00	1.8e-02	5.8e-01	4.5e+00	7.6e+00	3.9e-01	3.6e-03	1.1e-01	9.0e-01	1.5e+00
Ru-106	1.0e+00	9.4e-03	3.0e-01	2.3e+00	4.0e+00	2.0e-01	1.9e-03	5.9e-02	4.7e-01	8.0e-01
Ag-108m	7.6e+00	6.9e-02	2.2e+00	1.7e+01	2.9e+01	1.5e+00	1.4e-02	4.3e-01	3.4e+00	5.8e+00
Ag-110m	1.3e+01	1.2e-01	3.9e+00	3.0e+01	5.1e+01	2.6e+00	2.4e-02	7.7e-01	6.0e+00	1.0e+01
Cd-109	1.9e-02	1.7e-04	5.5e-03	4.2e-02	7.2e-02	3.7e-03	3.4e-05	1.1e-03	8.4e-03	1.4e-02
Sn-113	1.1e+00	1.0e-02	3.2e-01	2.5e+00	4.2e+00	2.2e-01	2.0e-03	6.3e-02	5.0e-01	8.5e-01
Sb-124	8.8e+00	8.1e-02	2.6e+00	2.0e+01	3.4e+01	1.7e+00	1.6e-02	5.0e-01	4.0e+00	6.7e+00
Sb-125	1.9e+00	1.7e-02	5.6e-01	4.3e+00	7.3e+00	3.8e-01	3.4e-03	1.1e-01	8.6e-01	1.5e+00
Te-123m	4.7e-01	4.3e-03	1.4e-01	1.1e+00	1.8e+00	9.2e-02	8.5e-04	2.7e-02	2.1e-01	3.6e-01
Te-127m	2.5e-02	2.3e-04	7.2e-03	5.6e-02	9.5e-02	4.9e-03	4.5e-05	1.4e-03	1.1e-02	1.9e-02
I-125	9.5e-03	8.7e-05	2.8e-03	2.2e-02	3.6e-02	1.9e-03	1.7e-05	5.4e-04	4.3e-03	7.3e-03
I-129	8.0e-03	7.3e-05	2.4e-03	1.8e-02	3.1e-02	1.6e-03	1.5e-05	4.6e-04	3.6e-03	6.2e-03
I-131	1.2e+00	1.0e-02	3.3e-01	2.7e+00	4.5e+00	2.3e-01	2.1e-03	6.5e-02	5.3e-01	9.0e-01
Cs-134	7.4e+00	6.8e-02	2.2e+00	1.7e+01	2.8e+01	1.5e+00	1.3e-02	4.3e-01	3.3e+00	5.7e+00
Cs-135	2.7e-05	2.5e-07	7.9e-06	6.1e-05	1.0e-04	5.3e-06	4.9e-08	1.5e-06	1.2e-05	2.1e-05
Cs-137	2.7e+00	2.4e-02	7.8e-01	6.0e+00	1.0e+01	5.3e-01	4.8e-03	1.5e-01	1.2e+00	2.1e+00
Ba-133	1.5e+00	1.4e-02	4.5e-01	3.4e+00	5.8e+00	3.0e-01	2.8e-03	8.7e-02	6.9e-01	1.2e+00
Ce-139	4.8e-01	4.3e-03	1.4e-01	1.1e+00	1.8e+00	9.4e-02	8.6e-04	2.7e-02	2.1e-01	3.7e-01
Ce-141	2.2e-01	2.0e-03	6.5e-02	5.0e-01	8.5e-01	4.4e-02	4.0e-04	1.3e-02	9.9e-02	1.7e-01
Ce-144	2.7e-01	2.5e-03	8.0e-02	6.1e-01	1.0e+00	5.4e-02	4.9e-04	1.6e-02	1.2e-01	2.1e-01
Pm-147	3.6e-05	3.3e-07	1.0e-05	8.1e-05	1.4e-04	7.1e-06	6.5e-08	2.1e-06	1.6e-05	2.8e-05

Table F2.60 Normalized effective doses from all pathways: Scrap disposal-municipal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	5.7e-07	5.2e-09	1.7e-07	1.3e-06	2.2e-06	1.1e-07	1.0e-09	3.3e-08	2.6e-07	4.4e-07
Eu-152	5.5e+00	5.1e-02	1.6e+00	1.2e+01	2.3e+01	1.1e+00	1.0e-02	3.2e-01	2.5e+00	4.3e+00
Eu-154	6.1e+00	5.6e-02	1.8e+00	1.4e+01	2.3e+01	1.2e+00	1.1e-02	3.5e-01	2.7e+00	4.7e+00
Eu-155	1.4e-01	1.2e-03	4.0e-02	3.0e-01	5.2e-01	2.7e-02	2.4e-04	7.8e-03	6.1e-02	1.0e-01
Gd-153	1.8e-01	1.6e-03	5.2e-02	4.0e-01	6.7e-01	3.5e-02	3.2e-04	1.0e-02	7.9e-02	1.4e-01
Tb-160	5.2e+00	4.8e-02	1.5e+00	1.2e+01	2.0e+01	1.0e+00	9.5e-03	3.0e-01	2.4e+00	4.0e+00
Tm-170	1.2e-02	1.1e-04	3.4e-03	2.6e-02	4.4e-02	2.3e-03	2.1e-05	6.6e-04	5.2e-03	8.8e-03
Tm-171	7.8e-04	7.2e-06	2.3e-04	1.8e-03	3.0e-03	1.5e-04	1.4e-06	4.5e-05	3.5e-04	6.0e-04
Ta-182	6.1e+00	5.6e-02	1.8e+00	1.4e+01	2.3e+01	1.2e+00	1.1e-02	3.5e-01	2.8e+00	4.7e+00
W-181	5.3e-02	4.9e-04	1.6e-02	1.2e-01	2.0e-01	1.0e-02	9.7e-05	3.1e-03	2.4e-02	4.1e-02
W-185	3.1e-04	2.8e-06	9.0e-05	7.0e-04	1.2e-03	6.1e-05	5.6e-07	1.8e-05	1.4e-04	2.3e-04
Re-185	3.2e+00	2.9e-02	9.3e-01	7.1e+00	1.2e+01	6.2e-01	5.7e-03	1.8e-01	1.4e+00	2.4e+00
Ir-192	3.4e+00	3.1e-02	1.0e+00	7.8e+00	1.3e+01	6.8e-01	6.2e-03	2.0e-01	1.6e+00	2.6e+00
Tl-204	3.2e-03	3.0e-05	9.5e-04	7.3e-03	1.2e-02	6.4e-04	5.9e-06	1.9e-04	1.5e-03	2.5e-03
Pb-210	6.3e-03	5.7e-05	1.8e-03	1.4e-02	2.4e-02	1.2e-03	1.1e-05	3.6e-04	2.8e-03	4.8e-03
Bi-207	7.4e+00	6.8e-02	2.2e+00	1.7e+01	2.8e+01	1.5e+00	1.3e-02	4.2e-01	3.3e+00	5.7e+00
Po-210	4.0e-05	3.7e-07	1.2e-05	9.1e-05	1.5e-04	8.0e-06	7.3e-08	2.3e-06	1.8e-05	3.1e-05
Ra-226	8.9e+00	8.1e-02	2.6e+00	2.0e+01	3.4e+01	1.7e+00	1.6e-02	5.1e-01	4.0e+00	6.8e+00
Ra-228	4.8e+00	4.4e-02	1.4e+00	1.1e+01	1.8e+01	9.4e-01	8.6e-03	2.7e-01	2.1e+00	3.7e+00
Ac-227	1.6e+00	1.4e-02	4.6e-01	3.5e+00	6.0e+00	3.1e-01	2.8e-03	9.0e-02	7.0e-01	1.2e+00
Th-228	8.1e+00	7.4e-02	2.4e+00	1.8e+01	3.1e+01	1.6e+00	1.5e-02	4.6e-01	3.6e+00	6.2e+00
Th-229	1.2e+00	1.1e-02	3.6e-01	2.8e+00	4.7e+00	2.4e-01	2.2e-03	7.1e-02	5.6e-01	9.5e-01
Th-230	9.4e-04	8.6e-06	2.8e-04	2.1e-03	3.6e-03	1.9e-04	1.7e-06	5.4e-05	4.2e-04	7.2e-04
Th-232	7.3e-03	5.9e-05	2.1e-03	1.7e-02	2.8e-02	1.4e-03	1.2e-05	4.0e-04	3.3e-03	5.5e-03
Pa-231	1.5e-01	1.4e-03	4.3e-02	3.3e-01	5.7e-01	2.9e-02	2.7e-04	8.5e-03	6.7e-02	1.1e-01
U-232	3.6e-02	2.9e-04	1.0e-02	8.4e-02	1.4e-01	7.0e-03	5.8e-05	2.0e-03	1.6e-02	2.7e-02
U-233	1.1e-03	9.7e-06	3.1e-04	2.4e-03	4.1e-03	2.1e-04	1.9e-06	6.1e-05	4.8e-04	8.1e-04
U-234	2.9e-04	2.6e-06	8.4e-05	6.5e-04	1.1e-03	5.7e-05	5.2e-07	1.7e-05	1.3e-04	2.2e-04
U-235	5.8e-01	5.3e-03	1.7e-01	1.3e+00	2.2e+00	1.1e-01	1.0e-03	3.3e-02	2.6e-01	4.5e-01
U-236	1.5e-04	1.4e-06	4.4e-05	3.4e-04	5.7e-04	2.9e-05	2.7e-07	8.6e-06	6.7e-05	1.1e-04
U-238	1.1e-01	1.1e-03	3.4e-02	2.6e-01	4.4e-01	2.3e-02	2.1e-04	6.6e-03	5.2e-02	8.8e-02
Np-237	5.5e-01	7.7e-03	2.5e-01	1.9e+00	3.2e+00	1.7e-01	1.5e-03	4.9e-02	3.8e-01	6.5e-01
Pu-236	1.5e-04	1.4e-06	4.5e-05	3.5e-04	5.9e-04	3.0e-05	2.8e-07	8.9e-06	6.9e-05	1.2e-04
Pu-238	9.8e-05	8.9e-07	2.9e-05	2.2e-04	3.8e-04	1.9e-05	1.8e-07	5.6e-06	4.4e-05	7.5e-05
Pu-239	2.2e-04	2.0e-06	6.5e-05	5.0e-04	8.5e-04	4.3e-05	4.0e-07	1.3e-05	9.9e-05	1.7e-04
Pu-240	8.4e-05	8.6e-07	2.8e-05	2.1e-04	3.6e-04	1.9e-05	1.7e-07	5.4e-06	4.3e-05	7.2e-05
Pu-241	5.0e-06	4.6e-08	1.5e-06	1.1e-05	1.9e-05	9.8e-07	9.1e-09	2.9e-07	2.3e-06	3.9e-06
Pu-242	8.3e-05	7.6e-07	2.4e-05	1.9e-04	3.2e-04	1.6e-05	1.5e-07	4.8e-06	3.8e-05	6.4e-05
Pu-244	1.6e+00	1.5e-02	4.7e-01	3.6e+00	6.2e+00	3.2e-01	2.9e-03	9.2e-02	7.2e-01	1.2e+00
Am-241	3.1e-02	2.8e-04	9.1e-03	7.0e-02	1.2e-01	6.1e-03	5.6e-05	1.8e-03	1.4e-02	2.4e-02
Am-242m	5.1e-02	4.7e-04	1.5e-02	1.2e-01	2.0e-01	1.0e-02	9.3e-05	2.9e-03	2.3e-02	3.9e-02
Am-243	6.8e-01	6.2e-03	2.0e-01	1.5e+00	2.6e+00	1.3e-01	1.2e-03	3.9e-02	3.1e-01	5.2e-01
Cm-242	1.1e-04	9.7e-07	3.1e-05	2.4e-04	4.1e-04	2.1e-05	1.9e-07	6.1e-06	4.8e-05	8.1e-05
Cm-243	4.5e-01	4.1e-03	1.3e-01	1.0e+00	1.7e+00	8.8e-02	8.1e-04	2.6e-02	2.0e-01	3.4e-01
Cm-244	7.5e-05	6.9e-07	2.2e-05	1.7e-04	2.9e-04	1.5e-05	1.4e-07	4.3e-06	3.4e-05	5.8e-05
Cm-245	2.6e-01	2.3e-03	7.5e-02	5.8e-01	9.8e-01	5.1e-02	4.6e-04	1.5e-02	1.2e-01	2.0e-01
Cm-246	6.9e-05	6.3e-07	2.0e-05	1.6e-04	2.7e-04	1.4e-05	1.3e-07	4.0e-06	3.1e-05	5.3e-05
Cm-247	1.4e+00	1.3e-02	4.2e-01	3.3e+00	5.5e+00	2.8e-01	2.6e-03	8.3e-02	6.5e-01	1.1e+00
Cm-248	5.2e-05	4.8e-07	1.5e-05	1.2e-04	2.0e-04	1.0e-05	9.5e-08	3.0e-06	2.4e-05	4.0e-05
Bk-249	3.7e-05	3.1e-07	1.1e-05	8.6e-05	1.4e-04	7.3e-06	6.1e-08	2.1e-06	1.7e-05	2.8e-05
Cf-248	7.3e-05	6.7e-07	2.1e-05	1.6e-04	2.8e-04	1.4e-05	1.3e-07	4.2e-06	3.3e-05	5.6e-05
Cf-249	1.4e+00	1.3e-02	4.2e-01	3.2e+00	5.5e+00	2.8e-01	2.6e-03	8.3e-02	6.5e-01	1.1e+00
Cf-250	7.0e-05	6.4e-07	2.0e-05	1.6e-04	2.7e-04	1.4e-05	1.3e-07	4.0e-06	3.1e-05	5.3e-05
Cf-251	4.0e-01	3.7e-03	1.2e-01	9.0e-01	1.5e+00	7.9e-02	7.3e-04	2.3e-02	1.8e-01	3.1e-01
Cf-252	1.1e-04	1.0e-06	3.3e-05	2.6e-04	4.4e-04	2.2e-05	2.1e-07	6.5e-06	5.1e-05	8.7e-05
Cf-254	2.2e-07	2.0e-09	6.3e-08	4.9e-07	8.3e-07	4.2e-08	3.9e-10	1.2e-08	9.7e-08	1.6e-07
Es-254	4.4e+00	4.0e-02	1.3e+00	9.8e+00	1.7e+01	8.6e-01	7.9e-03	2.5e-01	2.0e+00	3.3e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.61 Normalized effective doses from all pathways: EAF dust disposal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.8e+00	4.4e-01	2.0e+00	6.2e+00	7.5e+00	5.5e-01	8.8e-02	4.0e-01	1.2e+00	1.5e+00
P-32	5.2e-05	3.1e-06	2.6e-05	1.4e-04	1.9e-04	1.0e-05	6.1e-07	5.1e-06	2.7e-05	3.8e-05
S-35	1.2e-07	1.6e-08	8.2e-08	2.7e-07	3.4e-07	2.4e-08	3.3e-09	1.6e-08	5.4e-08	6.7e-08
Cl-36	2.6e-04	2.9e-05	1.7e-04	8.1e-04	8.4e-04	5.2e-05	5.7e-06	3.3e-05	1.2e-04	1.6e-04
K-40	2.2e-01	3.5e-02	1.6e-01	4.9e-01	6.0e-01	4.4e-02	6.9e-03	3.2e-02	9.7e-02	1.2e-01
Ca-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ca-45	9.9e-07	1.4e-07	6.9e-07	2.2e-06	2.8e-06	1.9e-07	2.9e-08	1.4e-07	4.4e-07	5.4e-07
Sc-46	1.9e-01	2.7e-02	1.3e-01	4.2e-01	5.3e-01	3.7e-02	5.4e-03	2.6e-02	8.3e-02	1.0e-01
Cr-51	6.6e-04	7.0e-05	4.0e-04	1.6e-03	2.1e-03	1.3e-04	1.4e-05	8.0e-05	3.1e-04	4.2e-04
Mn-53	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	7.1e-02	1.1e-02	5.1e-02	1.6e-01	1.9e-01	1.4e-02	2.2e-03	1.0e-02	3.1e-02	3.8e-02
Fe-55	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	2.3e-02	2.8e-03	1.5e-02	5.2e-02	6.7e-02	4.5e-03	5.7e-04	3.0e-03	1.0e-02	1.3e-02
Co-56	9.1e-02	1.2e-02	6.2e-02	2.1e-01	2.6e-01	1.8e-02	2.4e-03	1.2e-02	4.1e-02	5.1e-02
Co-57	2.4e-03	3.2e-04	1.7e-03	5.4e-03	6.8e-03	4.7e-04	6.4e-05	3.2e-04	1.1e-03	1.3e-03
Co-58	2.2e-02	2.8e-03	1.5e-02	5.0e-02	6.3e-02	4.3e-03	5.7e-04	2.9e-03	9.7e-03	1.2e-02
Co-60	8.8e-02	1.2e-02	6.1e-02	2.0e-01	2.5e-01	1.7e-02	2.4e-03	1.2e-02	4.0e-02	5.0e-02
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	1.3e+00	2.1e-01	9.3e-01	2.9e+00	3.4e+00	2.5e-01	4.1e-02	1.9e-01	5.6e-01	6.8e-01
As-73	8.6e-04	1.2e-04	6.0e-04	1.9e-03	2.5e-03	1.7e-04	2.3e-05	1.2e-04	3.8e-04	4.8e-04
Se-75	8.2e-01	9.7e-02	4.4e-01	1.4e+00	1.7e+00	1.2e-01	1.9e-02	8.9e-02	2.7e-01	3.2e-01
Sr-85	4.0e-02	5.6e-03	2.7e-02	9.0e-02	1.1e-01	7.8e-03	1.1e-03	5.3e-03	1.8e-02	2.2e-02
Sr-89	1.9e-04	2.6e-05	1.3e-04	4.4e-04	5.5e-04	3.8e-05	5.2e-06	2.6e-05	8.6e-05	1.1e-04
Sr-90	9.0e-04	1.4e-04	6.2e-04	2.0e-03	2.5e-03	1.8e-04	2.7e-05	1.2e-04	4.0e-04	4.9e-04
Y-91	5.2e-04	7.2e-05	3.6e-04	1.2e-03	1.5e-03	1.0e-04	1.5e-05	7.1e-05	2.3e-04	2.9e-04
Zr-93	7.7e-09	8.6e-10	5.0e-09	1.8e-08	2.3e-08	1.5e-09	1.8e-10	9.9e-10	3.5e-09	4.6e-09
Zr-95	1.0e-01	1.5e-02	7.1e-02	2.3e-01	2.8e-01	2.0e-02	3.0e-03	1.4e-02	4.5e-02	5.5e-02
Nb-93m	1.6e-06	2.3e-07	1.1e-06	3.6e-06	4.4e-06	3.2e-07	4.7e-08	2.2e-07	7.0e-07	8.6e-07
Nb-94	2.0e-01	2.9e-02	1.4e-01	4.4e-01	5.5e-01	3.9e-02	5.8e-03	2.8e-02	8.7e-02	1.1e-01
Nb-95	4.4e-02	5.4e-03	2.9e-02	1.0e-01	1.3e-01	8.7e-03	1.1e-03	5.7e-03	2.0e-02	2.6e-02
Mo-93	2.4e-06	3.4e-07	1.7e-06	5.5e-06	6.9e-06	4.8e-07	6.7e-08	3.4e-07	1.1e-06	1.3e-06
Tc-97	3.3e-06	4.6e-07	2.3e-06	7.5e-06	9.5e-06	6.5e-07	9.2e-08	4.6e-07	1.5e-06	1.9e-06
Tc-97m	8.5e-06	8.9e-07	4.5e-06	1.5e-05	1.9e-05	1.3e-06	1.7e-07	8.9e-07	2.9e-06	3.7e-06
Tc-99	8.4e-07	8.9e-08	4.5e-07	1.5e-06	1.8e-06	1.3e-07	1.8e-08	8.8e-08	2.9e-07	3.6e-07
Ru-103	7.4e-03	9.0e-04	4.8e-03	1.7e-02	2.2e-02	1.5e-03	1.8e-04	9.5e-04	3.3e-03	4.4e-03
Ru-106	6.7e-03	9.6e-04	4.7e-03	1.5e-02	1.9e-02	1.3e-03	1.9e-04	9.3e-04	3.0e-03	3.8e-03
Ag-108m	6.3e-01	7.5e-02	4.1e-01	1.5e+00	1.9e+00	1.2e-01	1.5e-02	8.1e-02	2.9e-01	3.7e-01
Ag-110m	1.0e+00	1.2e-01	6.5e-01	2.3e+00	3.0e+00	2.0e-01	2.4e-02	1.3e-01	4.6e-01	5.9e-01
Cd-109	9.4e-03	1.5e-03	6.8e-03	2.1e-02	2.5e-02	1.9e-03	3.0e-04	1.4e-03	4.1e-03	4.9e-03
Sn-113	8.2e-03	8.5e-04	4.2e-03	1.4e-02	1.8e-02	1.2e-03	1.7e-04	8.3e-04	2.8e-03	3.5e-03
Sb-124	3.9e-01	4.5e-02	2.5e-01	9.1e-01	1.2e+00	7.7e-02	8.8e-03	5.0e-02	1.8e-01	2.3e-01
Sb-125	1.2e-01	1.5e-02	8.2e-02	2.9e-01	3.6e-01	2.4e-02	3.0e-03	1.6e-02	5.6e-02	7.2e-02
Te-123m	1.9e-01	3.1e-02	1.4e-01	4.3e-01	5.2e-01	3.8e-02	6.1e-03	2.8e-02	8.5e-02	1.0e-01
Te-127m	1.0e-02	1.6e-03	7.2e-03	2.2e-02	2.7e-02	2.0e-03	3.1e-04	1.4e-03	4.4e-03	5.2e-03
I-125	8.0e-04	7.5e-05	4.9e-04	1.9e-03	2.5e-03	1.6e-04	1.5e-05	9.8e-05	3.8e-04	4.9e-04
I-129	1.0e-03	1.0e-04	6.4e-04	2.5e-03	3.2e-03	2.0e-04	2.1e-05	1.3e-04	4.8e-04	6.3e-04
I-131	1.4e-02	1.6e-04	3.3e-03	3.8e-02	6.7e-02	2.8e-03	3.2e-05	6.6e-04	7.6e-03	1.3e-02
Cs-134	3.7e+00	6.0e-01	2.7e+00	8.3e+00	1.0e+01	7.4e-01	1.2e-01	5.4e-01	1.6e+00	1.9e+00
Cs-135	1.4e-05	2.3e-06	1.0e-05	3.1e-05	3.7e-05	2.8e-06	4.5e-07	2.0e-06	6.1e-06	7.3e-06
Cs-137	1.4e+00	2.2e-01	1.0e+00	3.1e+00	3.7e+00	2.7e-01	4.4e-02	2.0e-01	6.0e-01	7.3e-01
Ba-133	4.0e-02	6.0e-03	2.8e-02	8.8e-02	1.1e-01	7.8e-03	1.2e-03	5.6e-03	1.7e-02	2.1e-02
Ce-139	1.0e-02	1.5e-03	7.3e-03	2.3e-02	2.9e-02	2.0e-03	3.1e-04	1.5e-03	4.5e-03	5.7e-03
Ce-141	2.8e-03	3.3e-04	1.8e-03	6.4e-03	8.2e-03	5.4e-04	6.7e-05	3.6e-04	1.3e-03	1.6e-03
Ce-144	8.5e-03	9.7e-04	4.6e-03	1.5e-02	1.8e-02	1.3e-03	1.9e-04	9.2e-04	2.9e-03	3.5e-03
Pm-147	9.2e-07	1.4e-07	6.5e-07	2.1e-06	2.6e-06	1.8e-07	2.8e-08	1.3e-07	4.0e-07	4.9e-07

Table F2.61 Normalized effective doses from all pathways: EAF dust disposal

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.5e-08	2.2e-09	1.1e-08	3.3e-08	4.2e-08	2.9e-09	4.3e-10	2.1e-09	6.5e-09	8.1e-09
Eu-152	1.4e-01	2.1e-02	1.0e-01	3.2e-01	4.0e-01	2.8e-02	4.2e-03	2.0e-02	6.4e-02	7.9e-02
Eu-154	1.6e-01	2.3e-02	1.1e-01	3.5e-01	4.4e-01	3.1e-02	4.6e-03	2.2e-02	7.0e-02	8.6e-02
Eu-155	3.5e-03	5.1e-04	2.5e-03	7.8e-03	9.7e-03	6.9e-04	1.0e-04	4.9e-04	1.5e-03	1.9e-03
Gd-153	4.2e-03	6.3e-04	3.0e-03	9.4e-03	1.2e-02	8.2e-04	1.2e-04	5.9e-04	1.8e-03	2.3e-03
Tb-160	9.7e-02	1.3e-02	6.8e-02	2.2e-01	2.7e-01	1.9e-02	2.7e-03	1.3e-02	4.3e-02	5.3e-02
Tm-170	2.5e-04	3.6e-05	1.8e-04	5.5e-04	6.9e-04	4.9e-05	7.2e-06	3.5e-05	1.1e-04	1.3e-04
Tm-171	2.0e-05	2.9e-06	1.4e-05	4.4e-05	5.5e-05	3.9e-06	5.8e-07	2.8e-06	8.6e-06	1.1e-05
Ta-182	1.3e-01	1.9e-02	8.9e-02	2.9e-01	3.6e-01	2.5e-02	3.7e-03	1.8e-02	5.6e-02	6.9e-02
W-181	3.0e-04	4.1e-05	2.1e-04	6.9e-04	8.8e-04	5.9e-05	8.2e-06	4.1e-05	1.4e-04	1.7e-04
W-185	1.5e-06	2.0e-07	1.0e-06	3.5e-06	4.5e-06	3.0e-07	4.1e-08	2.1e-07	6.9e-07	8.7e-07
Re-185	1.2e+00	1.9e-01	8.9e-01	2.8e+00	3.5e+00	2.4e-01	3.8e-02	1.8e-01	5.4e-01	6.5e-01
Ir-192	1.7e-02	2.3e-03	1.2e-02	3.9e-02	4.9e-02	3.4e-03	4.6e-04	2.3e-03	7.7e-03	9.8e-03
Tl-204	1.6e-03	2.6e-04	1.2e-03	3.6e-03	4.4e-03	3.2e-04	5.2e-05	2.4e-04	7.1e-04	8.5e-04
Pb-210	3.2e-03	5.2e-04	2.3e-03	7.1e-03	8.6e-03	6.3e-04	1.0e-04	4.6e-04	1.4e-03	1.7e-03
Bi-207	3.8e+00	6.1e-01	2.7e+00	8.4e+00	1.0e+01	7.5e-01	1.2e-01	5.5e-01	1.7e+00	2.0e+00
Po-210	1.7e-05	2.7e-06	1.2e-05	3.8e-05	4.6e-05	3.4e-06	5.4e-07	2.5e-06	7.5e-06	8.9e-06
Ra-226	2.3e-01	3.5e-02	1.7e-01	5.2e-01	6.6e-01	4.6e-02	6.9e-03	3.3e-02	1.0e-01	1.3e-01
Ra-228	1.3e-01	2.0e-02	9.3e-02	3.0e-01	3.7e-01	2.6e-02	3.9e-03	1.8e-02	5.8e-02	7.2e-02
Ac-227	4.1e-02	6.0e-03	2.9e-02	9.1e-02	1.1e-01	8.1e-03	1.2e-03	5.7e-03	1.8e-02	2.2e-02
Th-228	2.0e-01	3.0e-02	1.4e-01	4.5e-01	5.5e-01	4.0e-02	6.0e-03	2.9e-02	8.9e-02	1.1e-01
Th-229	3.2e-02	4.8e-03	2.3e-02	7.2e-02	8.8e-02	6.4e-03	9.6e-04	4.5e-03	1.4e-02	1.7e-02
Th-230	3.5e-05	5.1e-06	2.5e-05	7.9e-05	9.8e-05	6.9e-06	1.0e-06	4.9e-06	1.5e-05	1.9e-05
Th-232	1.8e-03	2.0e-04	1.2e-03	4.3e-03	5.6e-03	3.6e-04	4.1e-05	2.3e-04	8.3e-04	1.1e-03
Pa-231	4.0e-03	6.0e-04	2.8e-03	8.9e-03	1.1e-02	7.9e-04	1.2e-04	5.6e-04	1.8e-03	2.2e-03
U-232	8.7e-03	1.0e-03	5.7e-03	2.0e-02	2.7e-02	1.7e-03	2.1e-04	1.1e-03	4.0e-03	5.3e-03
U-233	2.8e-05	4.2e-06	2.0e-05	6.2e-05	7.8e-05	5.6e-06	8.5e-07	4.0e-06	1.2e-05	1.5e-05
U-234	7.6e-06	1.1e-06	5.4e-06	1.7e-05	2.1e-05	1.5e-06	2.3e-07	1.1e-06	3.3e-06	4.1e-06
U-235	1.5e-02	2.2e-03	1.1e-02	3.3e-02	4.2e-02	3.0e-03	4.6e-04	2.2e-03	6.6e-03	8.2e-03
U-236	3.9e-06	5.8e-07	2.8e-06	8.6e-06	1.1e-05	7.7e-07	1.2e-07	5.6e-07	1.7e-06	2.1e-06
U-238	3.0e-03	4.5e-04	2.2e-03	6.7e-03	8.4e-03	6.0e-04	9.1e-05	4.3e-04	1.3e-03	1.6e-03
Np-237	2.2e-02	3.3e-03	1.6e-02	4.8e-02	2.6.1e-02	4.4e-03	6.5e-04	3.1e-03	9.7e-03	1.2e-02
Pu-236	9.9e-06	1.1e-06	6.3e-06	2.3e-05	3.1e-05	1.9e-05	2.3e-07	1.2e-06	4.4e-06	5.9e-06
Pu-238	2.6e-06	3.9e-07	1.8e-06	5.8e-06	7.2e-06	5.1e-07	7.6e-08	3.5e-07	1.1e-06	1.4e-06
Pu-239	5.8e-06	8.7e-07	4.0e-06	1.3e-05	1.6e-05	1.1e-06	1.7e-07	8.0e-07	2.6e-06	3.2e-06
Pu-240	2.5e-06	3.7e-07	1.7e-06	5.6e-06	7.0e-06	4.9e-07	7.4e-08	3.4e-07	1.1e-06	1.4e-06
Pu-241	2.7e-07	3.7e-08	1.8e-07	6.1e-07	7.7e-07	5.1e-08	7.5e-09	3.6e-08	1.2e-07	1.5e-07
Pu-242	2.2e-06	3.3e-07	1.5e-06	4.9e-06	6.2e-06	4.3e-07	6.5e-08	3.0e-07	9.7e-07	1.2e-06
Pu-244	4.2e-02	6.3e-03	2.9e-02	9.5e-02	1.2e-01	8.3e-03	1.2e-03	5.8e-03	1.9e-02	2.3e-02
Am-241	8.2e-04	1.2e-04	5.8e-04	1.8e-03	2.3e-03	1.6e-04	2.5e-05	1.2e-04	3.6e-04	4.4e-04
Am-242m	1.3e-03	2.0e-04	9.6e-04	3.0e-03	3.8e-03	2.7e-04	4.1e-05	1.9e-04	6.0e-04	7.3e-04
Am-243	1.8e-02	2.7e-03	1.3e-02	4.0e-02	5.0e-02	3.5e-03	5.4e-04	2.5e-03	7.9e-03	9.7e-03
Cm-242	2.4e-06	3.4e-07	1.7e-06	5.4e-06	6.7e-06	4.7e-07	6.8e-08	3.3e-07	1.0e-06	1.3e-06
Cm-243	1.2e-02	1.7e-03	8.2e-03	2.6e-02	3.3e-02	2.3e-03	3.4e-04	1.6e-03	5.2e-03	6.4e-03
Cm-244	2.0e-06	2.9e-07	1.4e-06	4.4e-06	5.5e-06	3.9e-07	5.7e-08	2.7e-07	8.6e-07	1.1e-06
Cm-245	6.7e-03	9.8e-04	4.7e-03	1.5e-02	1.9e-02	1.3e-03	2.0e-04	9.3e-04	3.0e-03	3.7e-03
Cm-246	1.8e-06	2.7e-07	1.3e-06	4.1e-06	5.1e-06	3.6e-07	5.3e-08	2.5e-07	8.0e-07	1.0e-06
Cm-247	3.8e-02	5.6e-03	2.6e-02	8.5e-02	1.1e-01	7.5e-03	1.1e-03	5.2e-03	1.7e-02	2.1e-02
Cm-248	1.4e-06	2.0e-07	9.6e-07	3.1e-06	3.9e-06	2.7e-07	4.0e-08	1.9e-07	6.1e-07	7.5e-07
Bk-249	8.3e-06	9.6e-07	5.4e-06	1.9e-05	2.6e-05	1.6e-06	1.9e-07	1.1e-06	3.8e-06	5.0e-06
Cf-248	1.8e-06	2.6e-07	1.2e-06	4.0e-06	4.9e-06	3.5e-07	5.3e-08	2.4e-07	7.9e-07	9.6e-07
Cf-249	3.8e-02	5.7e-03	2.6e-02	8.5e-02	1.0e-01	7.4e-03	1.1e-03	5.2e-03	1.7e-02	2.0e-02
Cf-250	1.8e-06	2.7e-07	1.3e-06	4.1e-06	5.0e-06	3.6e-07	5.4e-08	2.5e-07	8.0e-07	9.8e-07
Cf-251	1.1e-02	1.6e-03	7.3e-03	2.4e-02	2.9e-02	2.1e-03	3.1e-04	1.5e-03	4.7e-03	5.7e-03
Cf-252	2.9e-06	4.4e-07	2.0e-06	6.5e-06	8.0e-06	5.7e-07	8.7e-08	4.0e-07	1.3e-06	1.6e-06
Cf-254	3.7e-09	5.3e-10	2.5e-09	8.4e-09	1.1e-08	7.4e-10	1.0e-10	5.0e-10	1.7e-09	2.1e-09
Es-254	1.0e-01	1.5e-02	7.2e-02	2.4e-01	2.9e-01	2.1e-02	3.0e-03	1.4e-02	4.7e-02	5.7e-02

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.62 Normalized effective doses from all pathways: Leachate-industrial-dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	3.8e-05	0.0e+00	0.0e+00	0.0e+00	2.3e-06	7.4e-06	0.0e+00	0.0e+00	0.0e+00	4.4e-07
Na-22	6.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	2.8e-13	0.0e+00	0.0e+00	0.0e+00	7.7e-37	5.6e-14	0.0e+00	0.0e+00	0.0e+00	1.5e-37
Cl-38	4.2e-02	0.0e+00	0.0e+00	5.7e-02	1.8e-01	8.2e-03	0.0e+00	0.0e+00	1.1e-02	3.6e-02
K-40	5.7e-01	0.0e+00	0.0e+00	8.8e-01	2.7e+00	1.1e-01	0.0e+00	0.0e+00	1.7e-01	5.4e-01
Ca-41	4.1e-03	0.0e+00	0.0e+00	6.0e-03	1.7e-02	8.0e-04	0.0e+00	0.0e+00	1.2e-03	3.6e-03
Ca-45	2.3e-20	0.0e+00	0.0e+00	2.7e-35	8.1e-35	4.5e-21	0.0e+00	0.0e+00	5.4e-36	1.6e-35
Sc-46	9.6e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	3.4e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	3.3e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.2e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	1.1e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	1.2e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	2.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.8e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	8.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	6.3e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	6.2e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	5.0e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	9.9e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	3.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	2.5e-29	0.0e+00	0.0e+00	0.0e+00	6.0e-37	4.6e-30	0.0e+00	0.0e+00	0.0e+00	1.2e-37
Sr-89	1.4e-34	0.0e+00	0.0e+00	0.0e+00	2.2e-36	2.7e-35	0.0e+00	0.0e+00	0.0e+00	4.2e-37
Sr-90	1.4e-03	0.0e+00	0.0e+00	0.0e+00	2.9e-08	2.7e-04	0.0e+00	0.0e+00	0.0e+00	6.1e-09
Y-91	4.2e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.9e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	4.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.5e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	5.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	1.3e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	1.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	1.9e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-43	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.8e-03	0.0e+00	0.0e+00	0.0e+00	8.0e-04	3.6e-04	0.0e+00	0.0e+00	0.0e+00	1.6e-04
Tc-97	1.4e-03	0.0e+00	0.0e+00	2.4e-03	6.1e-03	2.8e-04	0.0e+00	0.0e+00	4.7e-04	1.2e-03
Tc-97m	3.1e-09	0.0e+00	0.0e+00	1.1e-34	8.9e-34	5.6e-10	0.0e+00	0.0e+00	2.3e-35	1.4e-34
Tc-99	1.3e-02	0.0e+00	0.0e+00	2.2e-02	5.7e-02	2.7e-03	0.0e+00	0.0e+00	4.4e-03	1.1e-02
Ru-103	2.5e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	2.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	3.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	2.5e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	1.1e-13	0.0e+00	0.0e+00	0.0e+00	8.3e-38	1.9e-14	0.0e+00	0.0e+00	0.0e+00	1.6e-38
Sn-113	7.0e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	5.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	4.9e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.8e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	3.4e-10	0.0e+00	0.0e+00	0.0e+00	2.6e-34	6.4e-11	0.0e+00	0.0e+00	0.0e+00	5.0e-35
Te-127m	1.5e-10	0.0e+00	0.0e+00	0.0e+00	4.1e-34	2.8e-11	0.0e+00	0.0e+00	0.0e+00	8.1e-35
I-125	7.0e-14	0.0e+00	0.0e+00	1.8e-33	8.4e-33	1.2e-14	0.0e+00	0.0e+00	3.5e-34	1.7e-33
I-129	1.2e+01	0.0e+00	0.0e+00	1.0e+01	4.1e+01	2.5e+00	0.0e+00	0.0e+00	2.0e+00	8.1e+00
I-131	5.6e-34	0.0e+00	0.0e+00	3.5e-34	1.6e-33	1.1e-34	0.0e+00	0.0e+00	7.0e-35	3.3e-34
Cs-134	6.8e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	2.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	6.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	2.1e-03	0.0e+00	0.0e+00	1.0e-11	1.6e-04	4.2e-04	0.0e+00	0.0e+00	2.2e-12	3.2e-05
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.62 Normalized effective doses from all pathways: Leachate-Industrial-dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	2.7e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.9e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	3.2e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	2.4e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	6.3e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	8.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	1.4e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Re-185	1.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	5.6e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	5.0e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.7e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	8.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	3.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.5e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	8.3e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	3.7e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	8.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	1.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	9.0e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	1.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	8.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	8.4e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	5.8e-01	0.0e+00	0.0e+00	8.0e-02	1.2e+00	1.1e-01	0.0e+00	0.0e+00	1.6e-02	2.3e-01
Pu-236	7.7e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	4.7e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	5.7e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	5.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	3.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	5.7e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	6.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	5.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	4.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	1.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	8.1e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	1.9e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	1.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	4.7e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	5.7e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	2.0e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	9.6e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.63 Normalized effective doses from all pathways: Leachate–municipal–dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	1.4e-05	0.0e+00	0.0e+00	0.0e+00	3.7e-08	2.8e-06	0.0e+00	0.0e+00	0.0e+00	7.5e-09
Na-22	2.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.8e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.4e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	1.0e-13	0.0e+00	0.0e+00	0.0e+00	1.8e-37	1.8e-13	0.0e+00	0.0e+00	0.0e+00	3.4e-38
Cl-36	1.8e-02	0.0e+00	0.0e+00	1.9e-02	6.7e-02	3.7e-03	0.0e+00	0.0e+00	3.6e-03	1.3e-02
K-40	3.0e-01	0.0e+00	0.0e+00	3.3e-01	1.1e+00	5.8e-02	0.0e+00	0.0e+00	6.4e-02	2.1e-01
Ca-41	1.6e-03	0.0e+00	0.0e+00	2.1e-03	6.9e-03	3.2e-04	0.0e+00	0.0e+00	4.2e-04	1.4e-03
Ca-45	4.3e-20	0.0e+00	0.0e+00	7.8e-38	2.6e-35	8.6e-21	0.0e+00	0.0e+00	1.6e-38	5.2e-36
Sc-46	3.0e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-33	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	6.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	3.0e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	2.4e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	1.6e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	1.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	9.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	5.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	2.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	2.9e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	6.9e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	7.1e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	2.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	2.0e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-43	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	4.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	1.4e-38	0.0e+00	0.0e+00	0.0e+00	9.4e-38	2.8e-37	0.0e+00	0.0e+00	0.0e+00	1.9e-36
Sr-89	4.2e-36	0.0e+00	0.0e+00	0.0e+00	3.4e-37	8.1e-37	0.0e+00	0.0e+00	0.0e+00	6.9e-36
Sr-90	2.5e-03	0.0e+00	0.0e+00	0.0e+00	4.3e-09	4.9e-04	0.0e+00	0.0e+00	0.0e+00	8.2e-10
Y-91	2.1e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	3.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.5e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	3.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	5.0e-04	0.0e+00	0.0e+00	0.0e+00	1.9e-04	9.8e-05	0.0e+00	0.0e+00	0.0e+00	3.8e-05
Tc-97	6.2e-04	0.0e+00	0.0e+00	1.0e-03	2.8e-03	1.2e-04	0.0e+00	0.0e+00	1.9e-04	5.4e-04
Tc-97m	2.3e-10	0.0e+00	0.0e+00	4.2e-35	2.6e-34	4.9e-11	0.0e+00	0.0e+00	8.4e-36	5.3e-35
Tc-99	5.8e-03	0.0e+00	0.0e+00	9.4e-03	2.6e-02	1.1e-03	0.0e+00	0.0e+00	1.8e-03	5.0e-03
Ru-103	1.8e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	1.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	1.7e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	6.9e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	1.4e-14	0.0e+00	0.0e+00	0.0e+00	6.6e-37	2.6e-15	0.0e+00	0.0e+00	0.0e+00	1.2e-37
Sn-113	2.6e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.9e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	4.6e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.7e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	4.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	4.1e-10	0.0e+00	0.0e+00	0.0e+00	5.1e-35	7.4e-11	0.0e+00	0.0e+00	0.0e+00	1.0e-35
Te-127m	2.0e-10	0.0e+00	0.0e+00	0.0e+00	8.1e-35	3.6e-11	0.0e+00	0.0e+00	0.0e+00	1.6e-35
I-125	3.9e-14	0.0e+00	0.0e+00	5.0e-34	2.5e-33	8.4e-15	0.0e+00	0.0e+00	9.9e-35	5.0e-34
I-129	4.6e+00	0.0e+00	0.0e+00	4.0e+00	1.5e+01	9.0e-01	0.0e+00	0.0e+00	7.8e-01	3.0e+00
I-131	2.1e-34	0.0e+00	0.0e+00	9.8e-35	4.8e-34	4.1e-35	0.0e+00	0.0e+00	1.9e-35	9.4e-35
Cs-134	7.9e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	6.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	4.0e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.6e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	1.3e-03	0.0e+00	0.0e+00	9.8e-11	4.8e-05	2.7e-04	0.0e+00	0.0e+00	2.0e-11	1.0e-05
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.63 Normalized effective doses from all pathways: Leachate–municipal–dust

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	2.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	2.5e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.2e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	2.6e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	1.5e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	2.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.4e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Re-185	4.5e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	5.4e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	3.8e-30	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.9e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	7.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	2.1e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-210	2.8e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	1.9e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	9.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	6.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	4.5e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.0e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	5.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	4.2e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	4.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	2.4e-01	0.0e+00	0.0e+00	1.7e-02	3.6e-01	4.8e-02	0.0e+00	0.0e+00	3.4e-03	7.1e-02
Pu-236	1.1e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	1.0e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	3.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	2.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	1.7e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	3.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	3.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	2.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	2.7e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	4.1e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	5.7e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	1.1e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	9.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	3.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	2.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	6.0e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	3.9e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.64 Normalized effective doses from all pathways: Leachate-Industrial-scrap

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	2.0e-02	0.0e+00	1.4e-05	2.9e-02	7.6e-02	4.0e-03	0.0e+00	2.8e-06	5.6e-03	1.5e-02
C-14	3.3e-02	0.0e+00	0.0e+00	0.0e+00	4.9e-02	6.5e-03	0.0e+00	0.0e+00	0.0e+00	9.8e-03
Na-22	2.1e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	8.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	1.2e-12	0.0e+00	0.0e+00	0.0e+00	8.3e-35	2.3e-13	0.0e+00	0.0e+00	0.0e+00	1.6e-35
Cl-38	4.4e-01	0.0e+00	0.0e+00	8.1e-01	1.8e+00	8.6e-02	0.0e+00	0.0e+00	1.2e-01	3.6e-01
K-40	2.3e+00	0.0e+00	0.0e+00	3.3e+00	9.6e+00	4.5e-01	0.0e+00	0.0e+00	6.4e-01	1.9e+00
Ca-41	1.7e-01	0.0e+00	0.0e+00	2.8e-01	7.6e-01	3.3e-02	0.0e+00	0.0e+00	5.4e-02	1.5e-01
Ca-45	2.3e-19	0.0e+00	0.0e+00	1.4e-33	4.0e-33	4.5e-20	0.0e+00	0.0e+00	2.7e-34	8.0e-34
Sc-46	2.0e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.9e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	2.2e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	9.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	1.1e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	1.7e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	6.7e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-56	5.0e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	6.7e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	1.4e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	1.6e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	3.3e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.3e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	3.0e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	1.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	9.8e-25	0.0e+00	0.0e+00	0.0e+00	2.1e-35	1.6e-25	0.0e+00	0.0e+00	0.0e+00	4.4e-36
Sr-89	9.9e-29	0.0e+00	0.0e+00	0.0e+00	7.7e-35	1.6e-29	0.0e+00	0.0e+00	0.0e+00	1.6e-35
Sr-90	7.2e-02	0.0e+00	0.0e+00	0.0e+00	1.7e-07	1.5e-02	0.0e+00	0.0e+00	0.0e+00	3.3e-08
Y-91	2.0e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	7.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	9.0e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	1.9e-01	0.0e+00	0.0e+00	0.0e+00	2.2e-01	3.8e-02	0.0e+00	0.0e+00	0.0e+00	4.3e-02
Tc-97	3.3e-01	0.0e+00	0.0e+00	6.0e-01	1.5e+00	6.6e-02	0.0e+00	0.0e+00	1.2e-01	2.9e-01
Tc-97m	3.6e-08	0.0e+00	0.0e+00	3.2e-32	1.8e-31	7.1e-09	0.0e+00	0.0e+00	6.4e-33	3.6e-32
Tc-99	3.1e+00	0.0e+00	0.0e+00	5.6e+00	1.4e+01	6.2e-01	0.0e+00	0.0e+00	1.1e+00	2.7e+00
Ru-103	5.4e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	4.9e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.5e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	2.4e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	1.2e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.4e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	3.1e-14	0.0e+00	0.0e+00	0.0e+00	3.1e-35	5.8e-15	0.0e+00	0.0e+00	0.0e+00	6.4e-36
Sn-113	9.4e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	4.4e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.1e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	3.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.9e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	4.2e-10	0.0e+00	0.0e+00	0.0e+00	8.4e-34	8.3e-11	0.0e+00	0.0e+00	0.0e+00	1.7e-34
Te-127m	2.5e-10	0.0e+00	0.0e+00	0.0e+00	1.3e-33	4.9e-11	0.0e+00	0.0e+00	0.0e+00	2.6e-34
I-125	2.1e-16	0.0e+00	0.0e+00	2.4e-32	9.5e-32	4.7e-17	0.0e+00	0.0e+00	4.6e-33	1.9e-32
I-129	1.2e+02	0.0e+00	0.0e+00	1.3e+02	4.3e+02	2.4e+01	0.0e+00	0.0e+00	2.6e+01	8.5e+01
I-131	8.5e-33	0.0e+00	0.0e+00	4.8e-33	1.9e-32	1.3e-33	0.0e+00	0.0e+00	9.2e-34	3.7e-33
Cs-134	1.9e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.6e-16	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	8.6e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	4.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	9.7e-02	0.0e+00	0.0e+00	3.2e-11	3.6e-03	1.9e-02	0.0e+00	0.0e+00	5.8e-12	7.4e-04
Ce-139	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.64 Normalized effective doses from all pathways: Leachate-Industrial-scrap

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	2.2e-31	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-32	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	4.9e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.2e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	3.9e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	3.0e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	5.9e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.5e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.7e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	9.4e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	1.3e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	8.8e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	1.8e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	3.0e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.1e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	1.4e-34	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	7.7e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	5.9e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	4.2e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	5.1e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.9e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	3.8e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	3.9e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	2.9e+01	0.0e+00	0.0e+00	4.8e+00	5.7e+01	5.6e+00	0.0e+00	0.0e+00	9.5e-01	1.1e+01
Pu-236	7.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	2.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	6.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	6.5e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	3.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	6.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	7.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	8.3e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	5.5e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.9e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	2.0e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	3.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	6.9e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	5.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	1.9e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.9e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	3.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.6e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	8.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	3.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.7e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.65 Normalized effective doses from all pathways: Leachate–municipal–scrap

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	8.1e-03	0.0e+00	4.1e-06	1.0e-02	2.8e-02	1.6e-03	0.0e+00	8.3e-07	2.0e-03	5.6e-03
C-14	1.3e-02	0.0e+00	0.0e+00	1.2e-04	2.0e-02	2.6e-03	0.0e+00	0.0e+00	2.5e-05	3.9e-03
Na-22	5.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	1.9e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	3.3e-15	0.0e+00	0.0e+00	0.0e+00	1.2e-35	6.1e-16	0.0e+00	0.0e+00	0.0e+00	2.3e-36
Cl-36	1.7e-01	0.0e+00	0.0e+00	1.8e-01	6.3e-01	3.4e-02	0.0e+00	0.0e+00	3.6e-02	1.3e-01
K-40	8.9e-01	0.0e+00	0.0e+00	1.1e+00	3.7e+00	1.8e-01	0.0e+00	0.0e+00	2.1e-01	7.2e-01
Ca-41	8.6e-02	0.0e+00	0.0e+00	8.4e-02	2.9e-01	1.3e-02	0.0e+00	0.0e+00	1.7e-02	5.6e-02
Ca-45	8.7e-19	0.0e+00	0.0e+00	3.2e-34	1.1e-33	1.6e-19	0.0e+00	0.0e+00	6.4e-35	2.1e-34
Sc-46	5.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.4e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-53	2.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mn-54	9.8e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-55	2.0e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Fe-59	3.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.8e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	3.5e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.6e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	6.6e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	2.5e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.8e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	6.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	1.0e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.8e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	1.8e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	1.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	1.7e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.7e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	2.5e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.6e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.0e-31	0.0e+00	0.0e+00	0.0e+00	5.4e-36	6.5e-32	0.0e+00	0.0e+00	0.0e+00	1.0e-36
Sr-89	1.3e-34	0.0e+00	0.0e+00	0.0e+00	1.9e-35	2.5e-35	0.0e+00	0.0e+00	0.0e+00	3.8e-36
Sr-90	3.6e-02	0.0e+00	0.0e+00	0.0e+00	2.5e-07	6.8e-03	0.0e+00	0.0e+00	0.0e+00	5.3e-08
Y-91	1.1e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	6.4e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	7.7e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	9.1e-02	0.0e+00	0.0e+00	0.0e+00	7.4e-02	1.8e-02	0.0e+00	0.0e+00	0.0e+00	1.4e-02
Tc-97	1.3e-01	0.0e+00	0.0e+00	2.2e-01	5.6e-01	2.7e-02	0.0e+00	0.0e+00	4.3e-02	1.1e-01
Tc-97m	4.5e-07	0.0e+00	0.0e+00	9.8e-33	8.9e-32	9.1e-08	0.0e+00	0.0e+00	2.0e-33	1.4e-32
Tc-99	1.3e+00	0.0e+00	0.0e+00	2.1e+00	5.3e+00	2.5e-01	0.0e+00	0.0e+00	4.1e-01	1.1e+00
Ru-103	6.4e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	1.4e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.7e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	5.4e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	2.8e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.4e-37	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	2.1e-12	0.0e+00	0.0e+00	0.0e+00	1.2e-37	3.9e-13	0.0e+00	0.0e+00	0.0e+00	2.2e-38
Sn-113	8.4e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	4.8e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	4.1e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.9e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	1.1e-09	0.0e+00	0.0e+00	5.5e-38	1.9e-34	2.5e-10	0.0e+00	0.0e+00	1.0e-38	3.7e-35
Te-127m	8.3e-10	0.0e+00	0.0e+00	8.8e-38	3.0e-34	1.9e-10	0.0e+00	0.0e+00	1.6e-38	5.9e-35
I-125	2.6e-13	0.0e+00	0.0e+00	6.5e-33	2.6e-32	5.0e-14	0.0e+00	0.0e+00	1.3e-33	5.3e-33
I-129	5.2e+01	0.0e+00	0.0e+00	4.4e+01	1.6e+02	1.0e+01	0.0e+00	0.0e+00	8.6e+00	3.2e+01
I-131	3.1e-33	0.0e+00	0.0e+00	1.2e-33	5.0e-33	6.1e-34	0.0e+00	0.0e+00	2.5e-34	9.9e-34
Cs-134	3.9e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.0e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	8.0e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	3.0e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	5.9e-02	0.0e+00	0.0e+00	3.0e-10	1.8e-03	1.1e-02	0.0e+00	0.0e+00	6.3e-11	3.8e-04
Ce-139	5.9e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	3.8e-41	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.8e-42	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	2.5e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.1e-40	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.65 Normalized effective doses from all pathways: Leachate-municipal-scrap

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	4.2e-17	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.3e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-170	5.5e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tm-171	1.1e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ta-182	1.9e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.9e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-181	1.0e-18	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-19	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	2.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Re-185	2.6e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-15	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	8.4e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.9e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	3.0e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.7e-27	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	1.6e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	6.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	1.7e-35	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-36	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	1.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	2.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-233	2.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-234	1.7e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-235	2.1e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-236	1.5e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.1e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-238	1.6e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Np-237	1.1e+01	0.0e+00	0.0e+00	1.0e+00	1.1e+01	2.1e+00	0.0e+00	0.0e+00	2.1e-01	3.3e+00
Pu-236	1.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.6e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	4.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	3.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	3.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	3.0e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	3.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.2e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	3.3e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.6e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	7.8e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	3.4e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.9e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	2.7e-01	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	7.9e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	1.8e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	1.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	4.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	5.7e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.0e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	1.6e-38	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-39	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	7.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3

Table F2.68 Normalized effective doses from all pathways: Leachate–steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
H-3	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
C-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Na-22	2.7e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.6e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
P-32	3.9e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.7e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00
S-35	1.5e-10	0.0e+00	0.0e+00	2.1e-23	1.2e-22	2.9e-11	0.0e+00	0.0e+00	4.1e-24	2.4e-23
Cl-36	2.0e+00	0.0e+00	0.0e+00	3.6e+00	8.3e+00	3.9e-01	0.0e+00	0.0e+00	7.3e-01	1.7e+00
K-40	2.8e+00	0.0e+00	0.0e+00	5.7e+00	1.2e+01	5.5e-01	0.0e+00	0.0e+00	1.1e+00	2.3e+00
Ca-41	1.8e-01	0.0e+00	0.0e+00	3.7e-01	7.5e-01	3.5e-02	0.0e+00	0.0e+00	7.2e-02	1.5e-01
Ca-45	3.1e-08	0.0e+00	0.0e+00	4.9e-18	1.3e-17	5.9e-07	0.0e+00	0.0e+00	9.9e-19	2.6e-18
Sc-46	2.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cr-51	1.6e-24	0.0e+00	0.0e+00	0.0e+00	2.1e-24	3.1e-25	0.0e+00	0.0e+00	0.0e+00	4.0e-25
Mn-53	2.0e-08	0.0e+00	0.0e+00	0.0e+00	9.5e-07	4.0e-07	0.0e+00	0.0e+00	0.0e+00	1.8e-07
Mn-54	8.5e-10	0.0e+00	0.0e+00	0.0e+00	1.0e-22	1.9e-10	0.0e+00	0.0e+00	0.0e+00	1.9e-23
Fe-55	9.7e-11	0.0e+00	0.0e+00	0.0e+00	1.5e-24	2.1e-11	0.0e+00	0.0e+00	0.0e+00	3.0e-25
Fe-59	2.1e-23	0.0e+00	0.0e+00	0.0e+00	7.7e-24	4.2e-24	0.0e+00	0.0e+00	0.0e+00	1.5e-24
Co-56	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-57	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-58	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Co-60	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-59	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ni-63	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zn-65	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
As-73	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Se-75	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sr-85	3.9e-11	0.0e+00	0.0e+00	2.2e-19	1.1e-18	9.4e-12	0.0e+00	0.0e+00	4.5e-20	2.2e-19
Sr-89	5.5e-12	0.0e+00	0.0e+00	1.0e-18	5.2e-18	1.3e-12	0.0e+00	0.0e+00	2.1e-19	1.0e-18
Sr-90	4.2e-01	0.0e+00	0.0e+00	4.8e-05	1.1e-01	8.8e-02	0.0e+00	0.0e+00	1.0e-05	2.2e-02
Y-91	9.0e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-93	1.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.9e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Zr-95	1.3e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.8e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-93m	2.3e-13	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.6e-14	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-94	5.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.5e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Nb-95	7.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.4e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Mo-93	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-97m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tc-99	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-103	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ru-106	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-108m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ag-110m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cd-109	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sn-113	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-124	8.0e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Sb-125	4.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-123m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Te-127m	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
I-125	1.7e-05	0.0e+00	0.0e+00	3.0e-16	9.2e-16	3.6e-06	0.0e+00	0.0e+00	5.9e-17	1.8e-16
I-129	3.3e+02	0.0e+00	0.0e+00	4.5e+02	1.1e+03	6.4e+01	0.0e+00	0.0e+00	8.9e+01	2.3e+02
I-131	2.8e-16	0.0e+00	0.0e+00	3.8e-16	9.7e-16	5.5e-17	0.0e+00	0.0e+00	7.5e-17	1.9e-16
Cs-134	5.9e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-135	1.0e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cs-137	2.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ba-133	8.5e-02	0.0e+00	0.0e+00	3.5e-08	4.0e-02	1.3e-02	0.0e+00	0.0e+00	7.0e-09	7.9e-03
Ce-139	6.6e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-141	1.8e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ce-144	1.3e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.5e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pm-147	4.2e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.2e-27	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Table F2.66 Normalized effective doses from all pathways: Leachate-steel slag

Radionuclide	Mass-based effective dose (μSv/y per Bq/g)					Surficial effective dose (μSv/y per Bq/cm²)				
	Mean	5th	50th	90th	95th	Mean	5th	50th	90th	95th
Sm-151	1.7e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-12	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-152	6.5e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-154	4.9e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00	9.3e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Eu-155	7.8e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.5e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Gd-153	5.2e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.1e-26	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tb-160	9.9e-11	0.0e+00	0.0e+00	0.0e+00	1.9e-22	1.8e-11	0.0e+00	0.0e+00	0.0e+00	3.7e-23
Tm-170	5.6e-10	0.0e+00	0.0e+00	0.0e+00	1.8e-22	1.0e-10	0.0e+00	0.0e+00	0.0e+00	3.5e-23
Tm-171	3.1e-08	0.0e+00	0.0e+00	0.0e+00	2.0e-23	5.9e-09	0.0e+00	0.0e+00	0.0e+00	4.0e-24
Ta-182	1.3e-11	0.0e+00	0.0e+00	0.0e+00	4.3e-23	2.5e-12	0.0e+00	0.0e+00	0.0e+00	8.3e-24
W-181	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
W-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Os-185	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ir-192	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Tl-204	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pb-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bi-207	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Po-210	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-226	3.1e-02	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-03	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ra-228	9.9e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.0e-20	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Ac-227	1.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.2e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-228	1.2e-24	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.3e-25	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-229	1.2e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.2e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-230	9.4e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.7e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Th-232	2.1e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pa-231	5.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
U-232	3.3e-03	0.0e+00	0.0e+00	0.0e+00	1.4e-04	6.5e-04	0.0e+00	0.0e+00	0.0e+00	2.9e-05
U-233	2.1e-03	0.0e+00	0.0e+00	0.0e+00	2.3e-03	4.2e-04	0.0e+00	0.0e+00	0.0e+00	4.9e-04
U-234	1.5e-03	0.0e+00	0.0e+00	0.0e+00	1.7e-03	3.1e-04	0.0e+00	0.0e+00	0.0e+00	3.5e-04
U-235	1.8e-03	0.0e+00	0.0e+00	0.0e+00	2.1e-03	3.6e-04	0.0e+00	0.0e+00	0.0e+00	4.3e-04
U-236	1.4e-03	0.0e+00	0.0e+00	0.0e+00	1.6e-03	2.8e-04	0.0e+00	0.0e+00	0.0e+00	3.2e-04
U-238	1.5e-03	0.0e+00	0.0e+00	0.0e+00	1.6e-03	2.9e-04	0.0e+00	0.0e+00	0.0e+00	3.3e-04
Np-237	1.3e-02	0.0e+00	0.0e+00	1.1e-02	4.1e-02	2.5e-03	0.0e+00	0.0e+00	2.2e-03	8.1e-03
Pu-236	1.0e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	2.1e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-238	1.8e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-239	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.4e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-240	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-241	2.5e-06	0.0e+00	0.0e+00	0.0e+00	0.0e+00	5.0e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-242	1.7e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pu-244	1.8e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.5e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-241	4.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.8e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-242m	3.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.0e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Am-243	8.0e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.6e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-242	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-243	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-244	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-245	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-246	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-247	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cm-248	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Bk-249	1.7e-10	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.2e-11	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-248	4.0e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.8e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-249	2.1e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	4.1e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-250	6.5e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00	1.3e-07	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-251	3.2e-04	0.0e+00	0.0e+00	0.0e+00	0.0e+00	6.3e-05	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-252	4.5e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00	8.8e-23	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Cf-254	2.0e-21	0.0e+00	0.0e+00	0.0e+00	0.0e+00	3.9e-22	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Es-254	3.7e-08	0.0e+00	0.0e+00	0.0e+00	0.0e+00	7.3e-09	0.0e+00	0.0e+00	0.0e+00	0.0e+00

Note: To convert these values to conventional units (mrem/y per pCi/g or mrem/y per pCi/cm²), multiply by 3.7e-3