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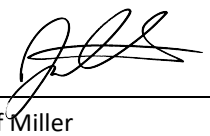
Supplier Document

WR-1 at the Whiteshell Laboratories Site Environmental Risk Assessment

WLDP-26000-REPT-006

Revision 5

Accepted by: 

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WR-1 AT THE WHITESHELL LABORATORIES SITE ENVIRONMENTAL RISK ASSESSMENT

WLDP-26000-REPT-006-REV-5

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WR-1 AT THE WHITESHELL LABORATORIES SITE ENVIRONMENTAL RISK ASSESSMENT

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LIST OF ACRONYMS AND SYMBOLS

AECL	Atomic Energy of Canada Limited
ALWTC	Active Liquid Waste Treatment Centre
BAF	bioaccumulation factor
BV	benchmark value
BC MOE	British Columbia Ministry of the Environment
CANDU	CANada Deuterium Uranium
CCME	Canadian Council of Ministers of the Environment
CCSF	Concrete Canister Storage Facility
CDWS	Canadian Drinking Water Standard
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
COG	CANDU Owners Group
COPC	contaminant of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSA	Canadian Standards Association
DC	dose coefficient
DFO	Fisheries and Oceans Canada
DRL	derived release limit
DSAR	Decommissioning Safety Assessment Report
EC	Environment Canada
EC_{50}	median effective concentration
EcoRA	ecological risk assessment
EIS	environmental impact statement
ERA	environmental risk assessment
ESEA	Manitoba Endangered Species and Ecosystems Act
FCSAP	Federal Contaminated Sites Action Plan
GSM	General Circulation Model
HC	Health Canada
HCF	Hot Cell Facility
HHRA	human health risk assessment
HQ	hazard quotient
HT	elemental tritium
HTO	tritium oxide
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IFTF	Immobilized Fuel Test Facility
ILCR	incremental lifetime cancer risk
IPCC	Intergovernmental Panel on Climate Change
IOC	intake of concern
ISD	In Situ Disposal
ISO	International Organization for Standardization

LCV	lowest chronic value
LC_{50}	median lethal concentration
LOAEL	Lowest Observed Adverse Effect Level
MAC	maximum allowable concentration
MASL	metres above sea level
MOE	Ontario Ministry of the Environment
MOECC	Ontario Ministry of the Environment and Climate Change
MOEE	Ontario Ministry of Environment and Energy
MWS	Manitoba Water Quality Standard
NCRP	National Council on Radiation Protection and Measurements
NEW	nuclear energy worker
NOAEL	No Observed Adverse Effect Level
OCR	Organic Cooled Reactor
OMOE	Ontario Ministry of the Environment
PHT	Primary Heat Transport
$PM_{2.5}$	particles nominally smaller than 2.5 µm in diameter
PM_{10}	particles nominally smaller than 10 µm in diameter
PWQO	provincial water quality objectiveRBE relative biological effectiveness
RCP	representative concentration pathway
SARA	Species at Risk Act
SDR	slowpoke demonstration reactor
SPM	suspended particulate matter
TDI	tolerable daily intake
TF	transfer factor
TQR	Tool Qualification Report
TRV	toxicity reference value
TWA	time weighted average
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
US EPA	United States Environmental Protection Agency
VC	valued component
WHO	World Health Organization
WL	Whiteshell Laboratories
WMA	Waste Management Area
WNRE	Whiteshell Nuclear Research Establishment
WQG	water quality guideline
WQSOG	Manitoba Water Quality Standards, Objectives and Guidelines
WR-1	Whiteshell Reactor #1
WRDF	Whiteshell Reactor Disposal Facility

EXECUTIVE SUMMARY

This document is the Environmental Risk Assessment (ERA) for *in situ disposal* (ISD) of the Whiteshell Reactor Number #1 (WR-1), Whiteshell Reactor Disposal Facility (WRDF) meeting the requirements of the Canadian Standards Association (CSA) N288.6 standard on environmental risk assessment for Class I nuclear facilities (CSA, 2012). The standard calls for both human health risk assessment (HHRA) and ecological risk assessment (EcoRA), for both radiological and non-radiological contaminants. The ERA provides information to support the Environmental Impact Statement (EIS) (Golder, EcoMetrix, InterGroup 2022) and the Decommissioning Safety Assessment Report (DSAR) (Golder 2021a) on the protection of the public and the environment during the WRDF Project.

The Whiteshell Laboratory (WL) site is located on the east bank of the Winnipeg River, approximately 100 km northeast of the City of Winnipeg. The WL site consists of ten major buildings and a number of smaller facilities. The site includes the Waste Management Area (WMA) and Concrete Canister Storage Facility (CCSF). This ERA is limited to the ISD of the WR-1 Building. Removal of the east and service wings of WR-1 Complex were assessed as part of the Comprehensive Study Report (AECL 2001) and are covered under CNL's existing decommissioning licence for the WL site. Activities required to prepare for ISD, such as isolation of the WR-1 and targeted remediation of hazardous materials, are also covered under CNL's existing decommissioning licence for the WL site. CNL is not proposing any changes to these decommissioning activities.

The overall objectives of this ERA are:

- Predict and assess the risk to relevant human and ecological receptors resulting from exposure to radiological and non-radiological substances expected to be released throughout the closure and post-closure phases of the Project;
- Inform decision-making in the EIS and DSAR; and
- Inform prioritization of mitigation measures.

The specific objectives of this ERA, consistent with CSA N288.6-12 are:

- To evaluate the risk to relevant human and ecological receptors resulting from exposure to contaminants related to the closure and post-closure activities of the Project.
- To recommend potential future monitoring based on the results of the ERA.

Source Term Characterization

Closure Phase

Activities associated with this phase will result in release of atmospheric contaminants into the environment. No surface water releases are expected.

The radiological releases considered for the closure phase are primarily those identified in the Derived Release Limit (DRL) Report (CNL 2016b) and the Source Term Characterization Report (CNL 2020a). These radionuclides have been found in WL's airborne effluent or are reasonably expected to be found during closure activities. Pre-grouting demolition includes disassembly of above ground structures that have existing radiation, such as the Primary Heat Transport (PHT) system. Post-grouting demolition includes disassembly of the reactor hall and ventilation stack. CNL intends to characterize, survey, and decontaminate or immobilize any residual contamination prior to post-grouting demolition to ensure that there is negligible release of radionuclides to the environment. Therefore, no release and subsequent exposure modelling has been performed for the post grouting demolition phase. It was assumed that most radionuclides would be released with suspended particulate matter (SPM). The particulate emission rates are presented in Section 6.2 of the EIS for assessment of maximum and average scenarios during the closure phase. Tritium was assumed to be released as water vapour, based on emission rates observed during characterization activities.

CNL has determined that a select number of non-radiological contaminants of potential concern (COPCs) are expected to be encapsulated as part of ISD. Therefore, these non-radiological COPCs may be released during grouting activities from the WL site. Assuming COPCs are released as SPM gives the highest release rate for non-radiological COPCs.

Post-Closure Phase

The post-closure phase, including the institutional control phase, is not likely to have a source of emissions for airborne contaminants. The grouting will be completed and the above-grade building and components removed. An engineered cover will have been installed on top of the buried material.

The focus in the post-closure phase is on potential releases from the WRDF to groundwater and subsequent migration of groundwater to surface water at the Winnipeg River. It is anticipated that the grout and the reactor components will gradually deteriorate over time, allowing the release of solutes into the groundwater. The source-term characterization for radionuclides and non-radionuclides remaining in WRDF at 50 years following shutdown is presented in Section 6.3.2 of the EIS. Year 2035 – 50 years following shutdown – corresponds to the assumed "release" of mass to porewater in the grout used for the ISD. Decay products of these inventory radionuclides expected to be present at 50 years were included in the release. A groundwater model (see Section 6.3.2 of the EIS) and Golder 2021b was used to predict mass loadings (g/year) of radiological and non-radiological COPCs. Groundwater flow simulations were performed using MODFLOW-2005 and Visual MODFLOW® (Version 4.6.0.156) as the numeric flow engine for the simulations. MODPATH was used to complete the particle tracking analyses necessary to illustrate the flow paths from the WRDF to the point of discharge at the Winnipeg River. An analytical approach, using GoldSim® (Version 11.1) was used to complete the solute transport modelling. Details on the MODFLOW and GoldSim® models are described in Section 6.3.2

of the EIS and related Appendices. Release to the Winnipeg River was modeled for 500,000 years and the maximum loading to the river for each radionuclide and non-radionuclide during this time was used in the ERA.

Human Health Risk Assessment (HHRA)

Predicted human exposures to COPCs from WR-1 and WRDF were evaluated on the basis of potential toxicological effects for non-carcinogenic COPCs, potential cancer risk for carcinogens, and potential radiation dose from radionuclides.

Closure

Human Receptors

Human receptors evaluated in both the radiological and non-radiological assessment included critical groups used for dose calculations in the DRL Report (CNL 2016b), and Traditional or Indigenous users of the area that might harvest country foods. Receptor groups specifically included:

- Farm A and F (year-round occupants, with livestock);
- Harvesters (Traditional or Indigenous users); and
- On-Site WL Worker.

Consistent with CSA N288.6-12, Nuclear Energy Workers and workers who lease businesses on-site are not addressed for the radiological assessment because their radiation exposure is monitored and their doses are controlled through CNL's Radiation Protection Program.

Farmers were assumed to have full-time residency and local diet fractions consistent with the DRL Report (CNL 2016b). The harvester was assumed to harvest on the WL site for 2 hours per week, downstream in the vicinity of Farm A for 2 hours per week, and upstream for 2 hours per week. Therefore, for each area, the Harvester's local diet fraction was 33%. Doses from each area were summed for total dose. Since in closure the relevant exposure pathways are the terrestrial pathways, neither the farmer or harvester ate local fish. All water for drinking, irrigation, bathing, and animal drinking was conservatively assumed to be obtained from a local well, influenced by atmospheric deposition, with the exception of the deer that drinks from pond water.

For radiological COPCs, various human age groups were assessed, including adult, 10 year old child, 1 year old infant that drinks formula or cows' milk, and 3 month old infant that drinks formula or nurses for Farms A and F; adult, 10 year old child, and 1 year old infant for the Harvester; and adult for the on-site worker. For non-radiological and non-carcinogenic COPCs, the age groups included adult and toddler for Farms A and F and for the Harvester, and adult for the on-site worker. For non-radiological and carcinogenic COPCs an integrated lifetime exposure was calculated for each receptor group.

Screening of COPCs for Human Health

Radiological contaminants were considered of public interest and therefore were carried forward for quantitative assessment in the HHRA, without a formal screening assessment. Non-radiological COPCs were screened against air quality guidelines and carried forward if a guideline was exceeded. Table ES-1 summarizes COPCs carried forward in the risk assessment.

Table ES-1: Summary of COPCs Selected for Human Health Risk Assessment During Closure

Category	Radiological COPC	Chemical COPC
Air	Am-241, Am-243, Ag-108m, C-14, Ca-41, Cl-36, Cm-244, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, Fe-55, HTO, I-129, Nb-94, Ni-63, Np-237, Np-239, OBT, Pu-238, Pu-239, Pu-240, Pu-241, Sr-90, Tc-99, U-235, U-238	None

Results of HHRA

Farm A was not quantitatively assessed for exposure during closure because the wind direction is preferentially towards Farm F, resulting in higher COPC activities. Therefore, Farm F is protective of Farm A.

Doses to radiological COPCs for the On-Site Worker, Farm F, and the Harvester were below the public dose limit of 1 mSv/a and the Project dose constraint of 0.25 mSv/a by 2 or more orders of magnitude. Since the dose estimates are a small fraction of the public dose limit, no discernable health effects are anticipated due to exposure of potential critical groups to radioactive releases from the WL site during closure.

Post-Closure

Human Receptors

Human receptors evaluated in both the radiological and non-radiological assessment included critical groups used for dose calculations in the DRL Report (CNL 2016b), and Traditional (or Indigenous) users of the area that harvest locally produced foods. A new Farm was also evaluated on-site to asses the impact of a farm family living in the area of maximum possible consequence. Receptor groups specifically included:

- Farm A (year-round occupants, with livestock);
- On-Site Farm (immediately beside and down gradient of the WRDF); and
- Harvesters (Traditional or Indigenous users).

Farmers were assumed to have full-time residency and local diet fractions consistent with the DRL Report (CNL 2016b). The harvester was assumed to harvest on the WL site for 2 hours per week, downstream in the vicinity of Farm A for 2 hours per week, and upstream

for 2 hours per week. Therefore, for each area, the Harvester's local diet fraction was 33%. Doses from each area were summed for total dose. All water for drinking, irrigation, bathing, and animal drinking was assumed to be obtained from the Winnipeg River.

For radiological COPCs, various human age groups were assessed, including adult, 10 year old child, 1 year old infant that drinks formula or cows' milk, and 3 month old infant that drinks formula or nurses for Farm A; and adult, 10 year old child, and 1 year old infant for the Harvester. For non-radiological and non-carcinogenic COPCs, the age groups included adult and toddler for Farm A and Harvester. For non-radiological and carcinogenic COPCs an integrated lifetime exposure was calculated for each receptor group.

Screening of COPCs for Human Health

Radiological contaminants were considered of public interest and therefore were carried forward for quantitative assessment in the HHRA, without a formal screening assessment. Non-radiological contaminants were screened against water quality guidelines and carried forward if a guideline was exceeded. Table ES-2 summarizes COPCs carried forward in the risk assessment.

Table ES-2: Summary of COPCs Selected for Human Health Risk Assessment during Post-Closure

Category	Radiological COPC	Chemical COPC
Water	Ac-225, Ac-227, Ag-108m, Bi-210, C-14, Ca-41, Cl-36, Gd-152, HTO, I-129, Nb-94, Ni-59, Ni-63, Np-237, OBT, Pa-231, Pa-233, Pb-210, Po-210, Pu-239, Pu-240, Ra-223, Ra-224, Ra-225, Ra-226, Ra-228, Tc-99, Th-227, Th-228, Th-229, Th-230, Th-231, Th-232, Th-234, U-233, U-234, U-235, U-236, U-238	Cadmium, Lead

Results of HHRA

Doses from radiological COPCs for the Farm A, the On-Site Farm, and the Harvester were below the public dose limit of 1 mSv/a and the Project dose constraint of 0.25 mSv/a. Since the dose estimates are a small fraction of the public dose limit, no discernable health effects are anticipated due to exposure of potential critical groups to radioactive releases from WRDF during post-closure.

Hazard Quotients (HQ) for non-radiological COPCs for Harvesters were below the target value of 0.2. HQs for the On-Site Farm and Farm A were below the target value of 0.2 with the exception of lead from drinking water from the Winnipeg River. When only the Project contribution is considered, HQs are below the target value. This indicates that the Project contribution of lead to the Winnipeg River is negligible. Therefore, no discernable health effects are anticipated due to exposure of potential receptors to non-radioactive releases from the WRDF during post-closure.

Ecological Risk Assessment (EcoRA)

It is generally an impractical task to assess the effect of radiological and non-radiological emissions on all the species of biota within a natural ecosystem, and specifically within the ecosystem around the WL site. Therefore, representative organisms are chosen for dose and risk analysis. These organisms are selected because they are known to exist on the site, and within the Winnipeg River, and are representative of major taxonomic groups or exposure pathways, or have a special importance or value. These organisms are known as Valued Components (VCs). VCs were selected based on existing information from the Comprehensive Study Report (AECL 2001). Stakeholder and public input into VC selection were also considered.

Closure

Valued Components

Valued components (VCs) were selected for dose and risk analysis because they are known to exist on-site, and/or are representative of major taxonomic/ecological groups, major pathways of exposure, or have a special importance or value. The model used for assessment of dose and risk is either specific to the selected VC species, or is a more generic biota assessment model that is appropriate to a number of species with similar exposure characteristics. Table ES-3 shows the selected VCs and the assessment models used in estimating their COPC exposure, dose and risk. Protection of the chosen VCs implies that other species in the same VC category are also protected.

Table ES-3: Summary of VCs and their Assessment Models used in the EcoRA during Closure

VC Category	Assessment Model	VC
Terrestrial Invertebrates	Soil Invertebrate	Earthworm
Terrestrial Birds	American Robin	American Robin
	Loggerhead Shrike	Loggerhead Shrike
Terrestrial Plants	Terrestrial Plant	Grass and Shrubs
	Terrestrial Plant	Berries
Terrestrial Mammals	Showshoe Hare	Showshoe Hare
	Meadow Vole	Meadow Vole
	White-tailed Deer	White-tailed Deer
	Common Shrew	Common Shrew
	Red Fox	Red Fox
	Little Brown Myotis (Bat)	Little Brown Myotis (Bat)

A number of threatened and endangered species have been identified on the WL site. Each of these species was considered by reference to a representative species already assessed in the EcoRA.

Screening of COPCs for Ecological Assessment

The radionuclides released to the atmospheric environment during closure apply to the EcoRA during closure and all were evaluated as COPCs. No non-radionuclides were carried forward as they were all below their respective air quality criteria.

Table ES-4: Summary of COPCs Selected for the Ecological Risk Assessment during Closure

Category	Radiological COPC	Chemical COPC
Air	Am-241, Am-243, Ag-108m, C-14, Ca-41, Cl-36, Cm-244, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, Fe-55, HTO, I-129, Nb-94, Ni-63, Np-237, Np-239, OBT, Pu-238, Pu-239, Pu-240, Pu-241, Sr-90, Tc-99, U-235, U-238	None

Results of the EcoRA

There are no exceedances of the UNSCEAR (2008) 2.4 mGy/d radiation benchmark for terrestrial biota on or near the WL site. All predicted doses are well below this level. Therefore, it is unlikely that there would be significant adverse effects on terrestrial populations or communities as a result of radionuclide releases from closure activities.

Post-Closure

Valued Components

Valued components (VCs) were selected for dose and risk analysis because they are known to exist on-site, and/or are representative of major taxonomic/ecological groups, major pathways of exposure, or have a special importance or value. The model used for assessment of dose and risk is either specific to the selected VC species, or is a more generic biota assessment model that is appropriate to a number of species with similar exposure characteristics. Table ES-5 shows the selected VCs and the assessment models used in estimating their COPC exposure, dose and risk. Protection of the chosen VCs implies that other species in the same VC category are also protected.

Table ES-5: Summary of VCs and their Assessment Models used in the EcoRA during Post-Closure

VC Category	Assessment Model	VC
Terrestrial Birds	Barn Swallow	Barn Swallow
Terrestrial Mammals	Little Brown Myotis (Bat)	Little Brown Myotis (Bat)
	Moose	Moose
Fish	Benthopelagic Forage Fish	Carmine Shiner
	Benthic Forage Fish	Lake Sturgeon
	Pelagic Predator Fish	Walleye
Aquatic Plants	Aquatic Plant	Submerged and emergent macrophyte

VC Category	Assessment Model	VC
Aquatic Invertebrates	Benthic Invertebrates	Benthic Invertebrates
Riparian Birds	Horned Grebe	Horned Grebe
	Trumpeter Swan	Trumpeter Swan
	Mallard	Mallard
Riparian Mammal	Mink	Mink

A number of threatened and endangered species have been identified near the WL site. Each of these species was considered by reference to a representative species already assessed in the EcoRA.

Screening of COPCs for Ecological Assessment

The radionuclides released to the river during post-closure apply to the EcoRA during post-closure and all were evaluated as COPCs. Non-radionuclides that exceeded surface water quality criteria were carried forward for further assessment.

Table ES-6: Summary of COPCs Selected for the Ecological Risk Assessment during Post-Closure

Category	Radiological COPC	Chemical COPC
Water	Ac-225, Ac-227, Ag-108m, Bi-210, C-14, Ca-41, Cl-36, Gd-152, HTO, I-129, Nb-94, Ni-59, Ni-63, Np-237, OBT, Pa-231, Pa-233, Pb-210, Po-210, Pu-239, Pu-240, Ra-223, Ra-224, Ra-225, Ra-226, Ra-228, Tc-99, Th-227, Th-228, Th-229, Th-230, Th-231, Th-232, Th-234, U-233, U-234, U-235, U-236, U-238	Cadmium, HB-40, Lead, Xylenes

Results of the EcoRA

There are no exceedances of the UNSCEAR (2008) 9.6 mGy/d radiation benchmark for aquatic biota in the Winnipeg River. Similarly, there are no exceedances of the 2.4 mGy/d radiation benchmark for terrestrial and riparian biota on or near the WL site. All predicted doses are well below these levels. Therefore, it is unlikely that there would be significant adverse effects on either aquatic or terrestrial populations or communities as a result of radionuclide releases from post-closure activities.

Hazard quotients (HQ) for ecological receptors due to exposure to cadmium, lead, HB-40 and xylene in groundwater after it is mixed with the Winnipeg River were below the target value of 1. The HQs for benthic invertebrates due to exposure to maximum concentrations of cadmium, lead, and HB-40 in groundwater at the seepage front were above the target level of 1; however, these concentrations are conservatively estimated, and would be spatially and temporally limited. Therefore, it is unlikely that there would be significant

adverse effects on either aquatic or terrestrial populations or communities as a result of these chemical releases.

Summary and Recommendations

Risks are not anticipated for humans or ecological receptors during either closure or post-closure activities related to the Project. As part of CNL's licence with the CNSC, environmental monitoring around the WL site will be required. Candidates for monitoring include tritium, C-14, cadmium, HB-40 and xylenes. Changes to surface water quality from the Project are predicted to be negligible and will likely not be detectable in the river or in biota. Sediment and/or benthic community monitoring may be appropriate at the groundwater seep, and upstream and downstream. Otherwise, monitoring efforts should focus on groundwater.

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1.0 INTRODUCTION

1.1 Background

CNL is proposing an *in-situ disposal* (ISD) approach to decommission Whiteshell Reactor #1 (WR-1). The below grade WR-1 systems, components and structures and associated radiological and non-radiological hazards will be permanently encased with grout. The above grade uncontaminated structures will be demolished and removed, creating the Whiteshell Reactor Disposal Facility (WRDF). An engineered cover will then be constructed over the below grade structure. *In situ* decommissioning is a permanent, passive decommissioning end state.

This ERA has been prepared to be compliant with CSA N288.6-12 “Environmental Risk Assessments for Class I Nuclear Facilities and Uranium Mines and Mills”. It also meets the requirements for an ERA outlined in Section 4.1 of REGDOC-2.9.1 (CNSC 2020). The ERA has been developed with current science and current regulatory attitudes in mind.

The ERA is used to support the conclusions made in the Environmental Impact Statement (EIS) (Golder, EcoMetrix, InterGroup 2022) and the Decommissioning Safety Assessment Report (DSAR) (Golder 2021a) on the protection of the public and the environment during the Project. The regulatory and guidance documents applicable to the EIS and the DSAR are discussed in their respective documents.

1.2 Objectives and Scope

The objectives of this ERA are to:

- Predict and assess the risk to relevant human and ecological receptors resulting from exposure to radiological and non-radiological substances expected to be released throughout the closure and post-closure phases of the Project;
- Inform decision-making in the EIS and DSAR; and
- Inform prioritization of mitigation measures.

The ERA uses the expected source terms of atmospheric and liquid releases to predict the transport of these substances through the environment, exposure and dose to the public, exposure and effects on representative ecological receptors, and any changes in habitat and effects on species that rely on that habitat (CNSC 2020).

The scope of the ERA encompasses both human and ecological health risks. The ERA is limited to the effects of WR-1 decommissioning only. It addresses risks related to both radiological and non-radiological contaminants of potential concern from decommissioning activities during the Normal Evolution Scenario. The Normal Evolution Scenario represents a reasonable extrapolation of present-day site features and receptor lifestyles, and it includes the expected evolution of the site post-closure and degradation of engineered

controls. The possible disruptive events and Bounding Scenarios are identified in Section 2.3.5 of the DSAR (Golder 2021a) and represent the occurrence of very unlikely events that could lead to high risk conditions. The assessment of the Disruptive Scenarios to support conclusions of the DSAR and EIS are presented in Appendix D to the ERA.

The temporal scale of the assessment includes the closure and post-closure phases, according to the schedule outlined in Table 1-1.

Closure phase will start in 2022 and last until 2026. The closure phase will include preparation and implementation of in situ disposal, which includes preparation for in situ disposal, grouting of below-grade structures and systems, removal of above-grade WR-1 structures and systems, installation of the concrete cap and engineered cover, and environmental controls and final site restoration.

The post-closure phase has two discrete periods: institutional control period and post-institutional control period. Institutional control is estimated to last a minimum of 100 years during which long-term performance monitoring and maintenance activities will continue, to demonstrate compliance with the safety case assumptions. Active controls such as monitoring and maintenance may be reduced or eliminated over time, but passive controls such as access restrictions (e.g., physical barriers/fencing, signage, and land title instruments/deed restrictions) will remain in place until the end of the institutional control period. Although the duration of institutional control is estimated to be at minimum 100 years, it is recognized that it will continue until the CNSC decides institutional controls are no longer needed. .

For the purposes of the assessment, post-institutional control is assumed to occur after year 2125 and continues indefinitely; however, the timeframe defined for assessment of potential effects as part of the normal evolution of the Project is 10,000 years. This time period encompasses the phase in which peak effects (i.e., doses) are anticipated. In addition, this is the approximate amount of time until the remaining radioactivity in the reactor vessel is comparable to that of existing natural analogues.

The modelling timeframe, consistent with CNSC Regulatory Policy P-290, ensures that “the assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time when the maximum impact is predicted to occur”.

Table 1-1: WR-1 Decommissioning Project Schedule

#	Project Activity Description	Timeframe
Closure Phase		
1	Preparation for In Situ Disposal	2022–2025
	WR-1 Deactivation and Segregation Complete	December 2023
2	Grouting of Below Grade Systems and Structures	2025
	In Situ Disposal Grouting Complete	January 2025
3	Removal of Above Grade Structures	2024-2025
	WR-1 Building Demolition and Decommissioning Complete	February 2025

#	Project Activity Description	Timeframe
4	Installation of Concrete Cap and Engineered Cover	June 2026
5	Final Site Restoration	2026
6	Preparation of Institutional Control	2026
	Site Turnover for Institutional Control and Monitoring	October 2026
Post-closure Phase		
7	Institutional Control	2025 – 2126 (minimum)
8	Post-institutional Control	Beyond 2126

Note: Dates are subject to change pending receipt of environmental assessment and licensing approvals

1.3 Applicability of the Comprehensive Study Report

The Project activities assessed in this ERA are limited to ISD of the WR-1 Building. Removal of the east and service wings of WR-1 Complex were assessed as part of the Comprehensive Study Report (AECL 2001) and are covered under CNL's existing decommissioning licence for the Whiteshell Laboratories site (WL site; Licence No. NRTEDL-W5-8.04/2018). Activities required to prepare for ISD, such as isolation of the WR-1 and targeted remediation of hazardous materials, are also covered under CNL's existing decommissioning licence for the WL site. CNL is not proposing any changes to these decommissioning activities.

1.4 Organization of Report

The overall structure of the ERA is consistent with Annex A of CSA Standard N288.6 on ERA, but has been adapted to suit the Project. Following this Introduction, the report presents a Site Description, including relevant facility structures and components, and environmental features. Section 3 presents the source-term characterization for atmospheric releases and groundwater/surface water releases that are used as inputs to the risk assessment. Sections 4 and 5 present the Human Health Risk Assessments (HHRA) for the closure phase, and the post-closure phase, respectively. Sections 6 and 7 present the Ecological Risk Assessments (EcoRA) for the closure phase, and the post-closure phase, respectively. Section 8 presents the Conclusions and Recommendations.

1.5 Quality Assurance/Quality Control

Throughout the planning and preparation of the ERA, all staff worked under EcoMetrix' ISO 9001:2008 certified Quality Management System and under the Project Quality Plan (Golder 2016). All work was internally reviewed and verified. Reviews included verification of input data in the IMPACT files against the source documents and verification of selected results with independent calculation spreadsheets, as well as review of report content. Comments have been dispositioned and addressed as appropriate by report revisions. The review process has been documented through a paper trail of review comments and dispositions. Examples of the independent calculation spreadsheets are provided in Appendix C.

The software used for the ERA was IMPACT™ Version 5.5.1, which is consistent with the equations outlined in CSA N288.1 (2014) and the methods outlined in CSA N288.6 (2012). The Tool Qualification Report (TQR) for IMPACT™ describes the verification and validation activities performed on IMPACT™ (EcoMetrix 2015). The tool qualification follows the CSA N286.7-99 (CSA 1999) guidelines for quality assurance in software development for nuclear power plants. A major component was a series of Verification and Validation exercises. When utilizing IMPACT™ for this Project, all inputs to IMPACT™ were checked along with an overall verification of IMPACT™ scenario files. Checks were performed of data and calculations to ensure that transcription errors and formula errors if any were caught and addressed.

ERICA version 1.2.1 was used as a source of biota dose coefficients. Its parameters, including dose coefficients, have been subject to validation through numerous intercomparison exercises, as described by Brown et al., (2008, 2013, 2016) and have generally compared well with other sources. The intercomparisons of dose coefficients are described by Vives I Batlle et al. (2007, 2011). The external dose predictions for small mammals have been validated against dosimetric measurements (Beresford *et al*. 2008). The code and database are updated from time to time, as described in its documented version history.

Quality assurance activities for other models used as inputs into the ERA (GoldSIM, HydroGeoSphere, and Visual Modflow) are discussed in Golder 2021b, including Appendix A: Software Verification - GoldSim.

2.0 SITE DESCRIPTION

2.1 Site Overview and Historical Context

The location of the WL site is on the east bank of the Winnipeg River, the centre of the main laboratory facility is located at approximately latitude 50°10’46”N and longitude 96°03’35”W. The site is approximately 100 km northeast of the City of Winnipeg and is accessed via Provincial Highway #11 and Provincial Road 211.

The WL consists of ten major buildings and a number of smaller support facilities. The Waste Management Area (WMA) and the Concrete Canister Storage Facility (CCSF) are located approximately 2.7 kilometers (km) northeast of the WL Main Campus. The general location of the WL site is shown in Figure 2-1 (Golder 2021a).

The WL site was established by AECL to carry out research and develop a higher temperature version of the CANDU reactor during the early 1960s. The site originally included the WR-1, an Organic Cooled Reactor (OCR), which was brought on-line in 1965. The OCR program was eliminated in the early 1970s to focus on the heavy water-cooled CANDU reactor system. Development of programs including the Nuclear Fuel Waste Management Program, SLOWPOKE Demonstration Reactor, CANDU Reactor Safety research projects and accelerator projects maintained WL as a diverse centre for research. Many other support facilities were required over the years to support the research programs. These included the WMA, CCSF, and Active Liquid Waste Treatment Centre (ALWTC) in 1963, Hot Cell Facilities (HCF) in 1965, the Immobilized Fuel Test Facility (IFTF) in 1984, the Van de Graaff Accelerator in 1970 (upgraded in 1979) and the Neutron Generator Facility in 1975.

AECL decided to discontinue research programs at WL as a result of the federal program review process that reduced funding to nuclear research. The federal government examined various alternatives from the WL site and recommended privatization. Attempts to attract a private owner to take over the facility were unsuccessful. Subsequently, AECL made the business decision in 1998 to close the WL site. Certain operations at the site are presently in various stages of operational shutdown. Experimental work expected for processing of active liquid wastes was concluded in the Shielded Facilities cleanup and removal of research equipment has also been completed. Both the Neutron Generator Facility and the Van de Graaff Accelerator have been shut down and detailed decommissioning plans have been prepared. The WR-1 was permanently shut down in 1985 and Phase 1 Decommissioning, which started in 1989, was completed in 1995. This shutdown involved removal of contaminant sources and readily-removable radioactive materials (e.g., irradiated reactor fuel) from the facility and loose contamination from the main floor (600 level) and first sub-level (500 level). The completion of Phase 1 Decommissioning established WR-1 in a state appropriate for a long deferment period during which radioactivity levels would be significantly reduced through natural decay prior to implementing further decommissioning work. At present, WR-1 is in a stable state, under a monitoring and surveillance program.

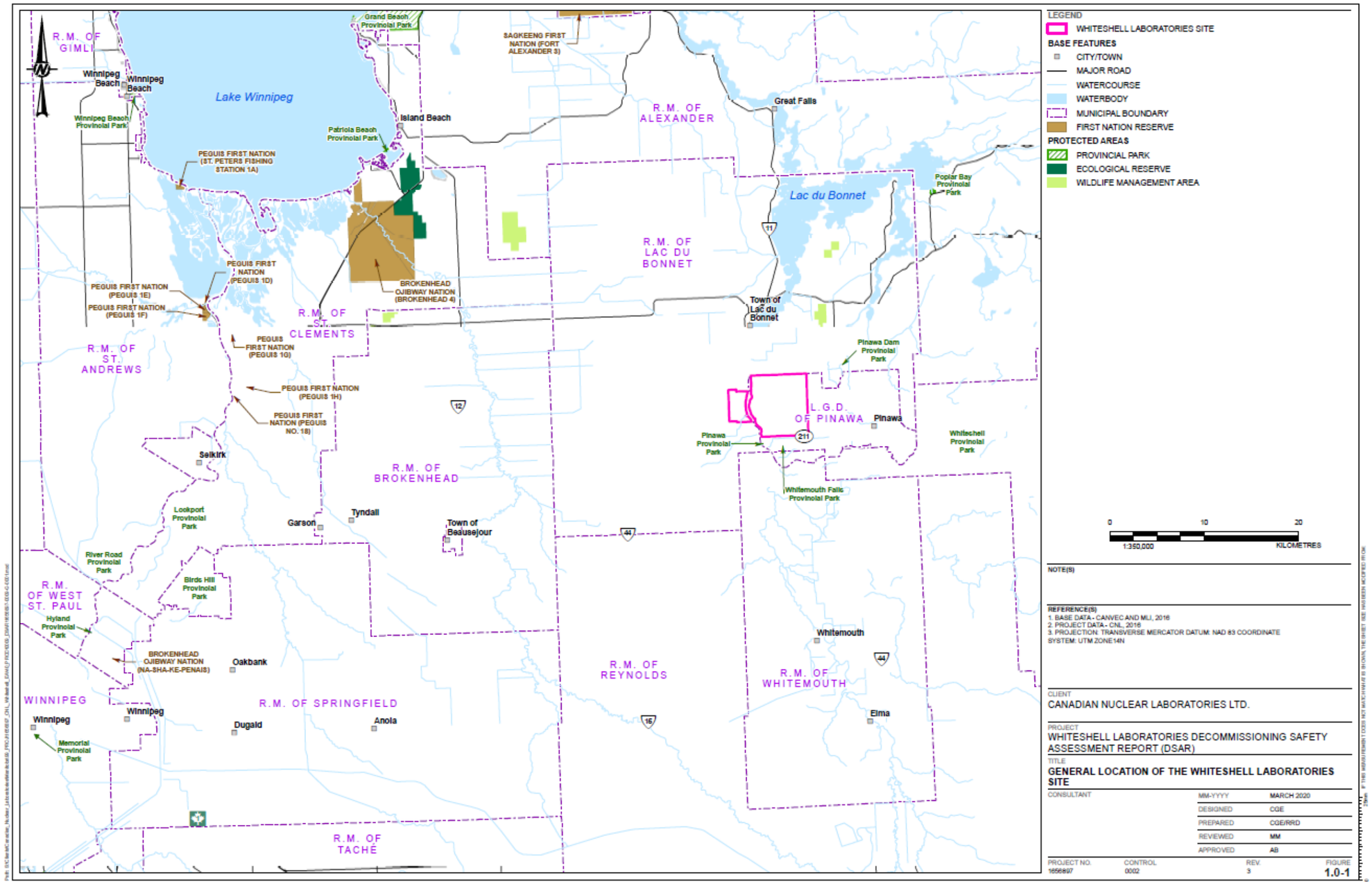


Figure 2-1: General Location of the Whiteshell Laboratories Site (Golder, 2021a)

2.2 Engineered Site Facilities

The WL site decommissioning encompasses all of the site facilities, buildings and land within the affected lands. In this subsection, site facilities within the vicinity of the Project are described for context. The decommissioning of the majority of the WL facilities is encompassed by the CSR and the existing Decommissioning License NRTEDL-W5-8.04/2018, while the Project encompasses the decommissioning of the WR-1 Building. The description of site facilities is focused on the WR-1.

The WR-1 Complex is located entirely within the WL site, and includes the main reactor building extending two levels above (levels 600 and 700) and five levels below grade (levels 100 to 500). The east and service wings house office space and supporting facilities.

The WR-1 Building is located within the central portion of the WR-1 Complex (Figure 2-2), and consists of seven floors with five of those floors being below grade (Level 100 is the bottom level below grade and Level 7 is the top floor above grade). Major components of the WR-1 Building include: reactor vessel, shielding, and experimental loops, which are described in more detail in Section 4.3.1 Project Components of the DSAR (Golder 2021a).

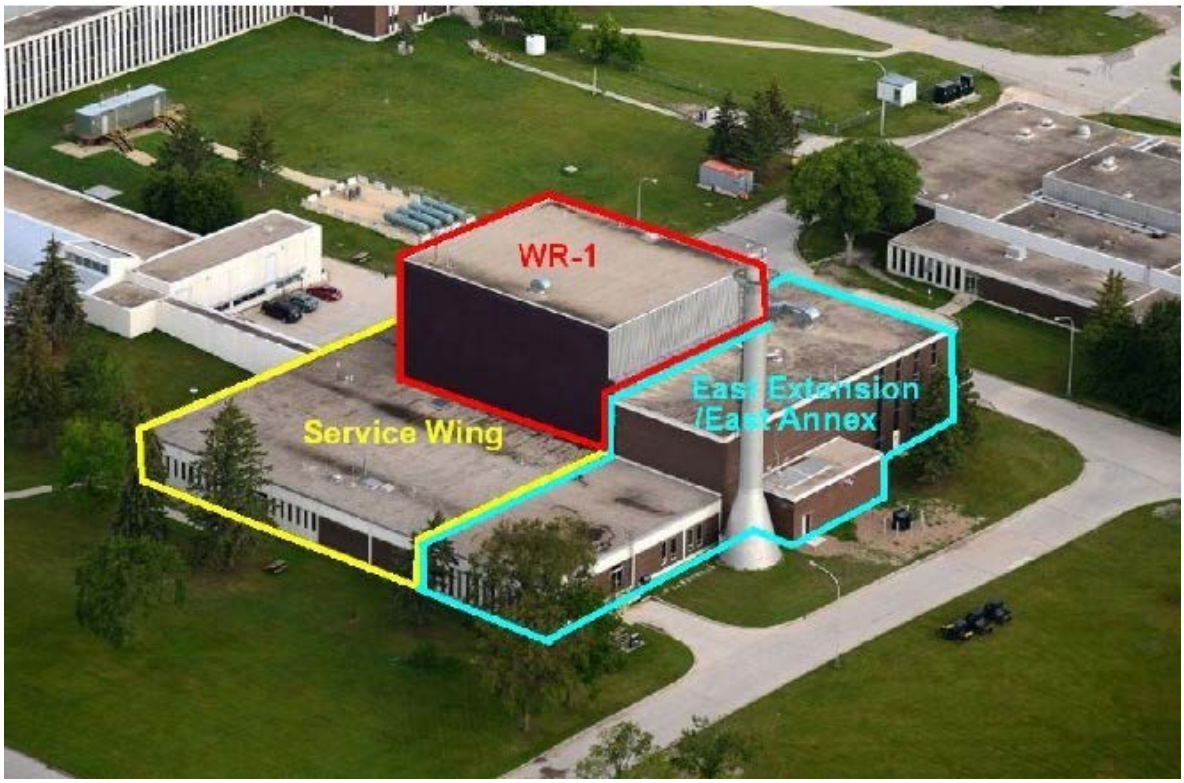


Figure 2-2: WR-1 Complex

2.3 Description of the Natural and Physical Environment

Various aspects of the WL natural environment and ecosystems have been monitored for many years. This section provides a summary of the climate, topography and surface

drainage, geology and hydrogeology, hydrology, aquatic and terrestrial habitat and biota, and human land use.

2.3.1 Current Climate and Current Climate Trends

Available daily meteorological data from the Pinawa Whiteshell Nuclear Research Establishment (WNRE) climate station (ID 5032162) has been collected for the period from 1981 through to 2010. This data closely matches the World Meteorological Organization most recent climate normal of 1981 through to 2010. Therefore, the climate was characterized based on a long continuous dataset that falls near the desired normal period (1981 through 2010) for a climate station located approximately 0.25 km east-southeast of the WR-1 Building. Table 2-1 provides the climate normals and trends.

Table 2-1: Climate Normals and Trends – Pinawa WNRE Climate Station (1981 – 2010)

Climate Indices	Normals	Decadal Trend	Statistical Significance
Total Precipitation [mm (equiv.)]	588.6	+55.9	significant at the 99th percentile
Spring Total Precipitation [mm (equiv.)]	117.1	+12.8	significant at the 90th percentile
Summer Total Precipitation [mm (equiv.)]	261.3	+25.7	significant at the 90th percentile
Fall Total Precipitation [mm (equiv.)]	144.1	+14.5	not statistically significant
Winter Total Precipitation [mm (equiv.)]	66.1	+9.3	significant at the 95th percentile
Total Snowfall [cm]	115.2	+6.3	not statistically significant
Total Rainfall [mm]	473.4	+61.2	significant at the 99th percentile
End of Winter (March 21) Snowpack [cm]	—	—	not statistically significant, not enough observations
Number of Period of More Than 10 Days With No Rain [#]	4.7	-0.4	not statistically significant
Length of Dry Spells [days]	17.0	+0.0	no apparent trend
Number of Days With >20mm Rainfall [#]	4.9	+1.0	significant at the 95th percentile
Number of Days With >15cm Snowfall [#]	0.5	+0.0	no apparent trend
Average Annual Temperature [°C]	2.8	+0.2	not statistically significant
Average Spring Temperature [°C]	2.9	+0.0	no apparent trend
Average Summer Temperature [°C]	17.9	+0.2	not statistically significant
Average Fall Temperature [°C]	4.5	+0.7	significant at the 95th percentile
Average Winter Temperature [°C]	-14.5	+0.3	not statistically significant
Number of Period of More Than 3 Days With Tmax >30°C [#]	0.8	+0.0	no apparent trend
Length of Heat Waves [days]	4.6	+0.0	no apparent trend
Maximum Daily Temperature [°C]	33.5	+0.0	no apparent trend
Number of Days with Freeze-Thaw Cycle [#]	44.9	-1.4	not statistically significant
Number of Period of More Than 3 Days With Tmin <-15°C [#]	7.8	-0.4	not statistically significant

Climate Indices	Normals	Decadal Trend	Statistical Significance
Length of Cold Spells [days]	21.8	-1.1	not statistically significant

2.3.2 Future Climate Conditions

2.3.2.1 Climate Projections from 2040 through 2100

Climate projections are discussed in detail in Section 10.4 of the EIS (Golder, EcoMetrix, InterGroup 2022) and in Golder 2017. The projected future climate up to 2100 has been described using the outputs from General Circulation Models (GCMs) accepted by the Intergovernmental Panel on Climate Change (IPCC) for various representative concentration pathways (RCPs). The closure phase is 2022 through 2026, for the Near Term of 2011 through 2040 the potential for there being climate change affects is very low. The model projections were selected for the desired future projection period including the Mid Term of 2041 through 2070 and the Far Term of 2071 through 2100. Table 2-2 provides the climate normal and trends.

Table 2-2: Model Projected Mean and Climate Normal for the Project Region for the Mid Term (2041 – 2070) and Far Term (2071 – 2100)

Period	Temperature [°C]			Precipitation [mm]		
	Climate Normal	Projected Mean	Difference	Climate Normal	Projected Mean	Difference
Mid Term (2041 – 2070)						
Annual	2.8	5.2	2.4	588.6	633.7	45.2
Spring	2.9	4.6	1.7	117.1	128.4	11.3
Summer	17.9	19.9	2.0	261.3	266.5	5.2
Fall	4.5	7.6	3.1	144.1	150.5	6.4
Winter	-14.5	-11.7	2.8	66.1	76.9	10.8
Far Term (2071 – 2100)						
Annual	2.8	6.0	3.2	588.6	647.1	58.6
Spring	2.9	5.5	2.5	117.1	132.3	15.2
Summer	17.9	20.8	2.8	261.3	268.3	7.0
Fall	4.5	8.4	3.9	144.1	152.7	8.6
Winter	-14.5	-10.8	3.6	66.1	79.8	13.7

2.3.2.2 Climate Projections from 2100 through 3000

Long Term (2100 through 3000) effects of climate change are highly dependent on the emission scenarios (i.e., RCPs), as a result the period beyond 2100 are discussed in a qualitative manner based on publicly available, peer-reviewed literature (Golder 2017). It is generally accepted that with increased temperature, mean sea levels and global precipitation will also increase. The impact of increased precipitation on the risk assessment of the post-closure phase is minimal. The focus in the post-closure phase is on aquatic pathways. The only influence of precipitation in the post-closure model is on the

irrigation rate. An increase in precipitation would result is less water needed to supplement rainfall; therefore, less water from the Winnipeg River in the vicinity of the WRDF would be needed for irrigation purposes. Therefore, any contaminants that have potentially migrated from the WRDF to the Winnipeg River would be less likely to end up as irrigation water for crops. Utilizing the current climate values within the model is therefore the most conservative approach to the assessment.

Global temperatures are predicted to rise between 0.6 and 7.8 degrees Celsius (°C) by the year 3000. The majority of the warming will occur between now and 2300, with warming rates slowing after stabilization of radiative forces. Changes in precipitation distribution and variability are anticipated to increase after 2100, with an estimated increase in global precipitation of 1 to 3% per degree Celsius of increase in temperature over the period from 2100 to 3000 (IPCC 2013). Results showed that if anthropogenic emissions are ceased abruptly, it would require centuries before temperatures would begin to decrease. If emissions stopped in 2300, temperatures would only decrease by about 1 to 2°C by year 3000.

2.3.2.3 Future Glaciation Cycles

Typically, quaternary glacial cycles are assumed to last approximately 100,000 years, with the glaciation phase lasting approximately 90,000 years and the deglaciation phase lasting approximately 10,000 years (Peltier 2011). The global warming projected until the year 3000 (0.6 to 7.8°C over 1,000 years) represents a much higher warming rate than the rate seen at the end of the last glacial period, which was a change of approximately 4°C over an estimated 8,000 years. This corresponds to a higher rate of increase in atmospheric carbon dioxide (CO_2) concentrations than in previous periods (Clark *et al*. 2016; Berger et al. 2003). Carbon dioxide concentrations and glaciation models coupled together predict a relatively long interglacial period of 40,000 to 55,000 years (Berger *et al*. 2003; Ganopolski et al. 2016) as compared to previous periods of 10,000 to 20,000 years due to higher atmospheric CO_2 concentrations. If concentrations of greenhouse gases remain similar to present day, the next significant glaciation event is not projected to occur before 100,000 years after present (Ganopolski *et al.* 2016).

The current interglacial period started about 11,700 years ago (Clark *et al*. 2016). Peltier (2011) concludes that if the concentrations of greenhouse gases rise as predicted, another glacial event is unlikely due to the increased surface warmth. However, projections for atmospheric concentrations 3,000 years after present are not available, let alone 100,000 years after present; therefore, a glacial event should not be discounted. For the purpose of this assessment, it is expected that the next glaciation cycle is not likely to occur before the year 100,000 after present, and when it does occur it is anticipated that the majority of North America and northern Europe and Asia will be covered by vast sheets of ice for tens of thousands of years.

This potential disruptive event is addressed in Section 2.3.5.2.6 of DSAR (Golder 2021a).

2.3.3 Topography and Surface Drainage

The ground level (600 Level of Building 100) of WR-1 is at 266.7 metres above sea level (masl). The WL main campus is relatively flat (0 to 1% slope), the grass is kept cut and only a few trees are present. The WL site is in general a mixed forest and is in general fairly flat rising slightly to the east near the WL landfill located several kilometers away from WR-1 building. To the west the ground slopes gently (7% to 8% slope) westwards towards the Winnipeg River. The Winnipeg River is located approximately 500 m to the west of the WR-1 location at approximately 255.10 masl. The natural drainage is towards the Winnipeg River. A break in topography occurs at the west bank of the Winnipeg River, with an approximate water level elevation of 255 masl. The river bottom is near the bedrock surface at an elevation of about 252 masl.

Drainage ditches have been constructed to control and direct the flow of excess runoff and surface water pooling outside of the plant site with outflow discharge into the Winnipeg River. The roads, parking pads, and roof discharge from buildings within the plant site perimeter are drained via underground storm drains, which flow into the main drainage ditches at the plant site perimeter.

Additional site drainage has been constructed up gradient from the plant site near the WMA and lagoon areas to direct surface water from the WMA and outer areas of the site to the Winnipeg River. Most of the drainage is directed through a ditch system that enters the Winnipeg River to the north of the lagoons (Figure 2-5 in Dillon 2018). To the south of the WL main campus drainage to the Winnipeg River is dominated by a natural swale and the site access road ditches.

2.3.4 Geology and Hydrogeology

For a detailed description of the regional and local geology and hydrogeology of the WL site refer to the Geosynthesis for WR-1 Environmental Impact Statement (CNL 2021a) and the Hydrogeological Study Report (Dillon 2018).

2.3.4.1 Surficial Geology

Consistent with the Geosynthesis for WR-1 Environmental Impact Statement (CNL 2021a), the surficial geology consists of (from bedrock upwards):

- Glacial Till (also referred to as Basal Sand and Basal Till);
- Glacio Lacustrine Clay (also referred to as Clay Till as the lower portion of this unit is derived from the Glacial Till), and;
- Transitional Glacio Lacustrine Clay (Clay) and Glacio Fluvial and Glacio Lacustrine Sandy Silt (Interbedded Silt and Clay).

Noted differences at the WR-1 site from observations at the WMA, includes: the existence of the upper organic complex, increased clay thickness, and reduced sand content in the

deepest overburden unit. Surficial geology at the plant site is shown in cross-sections on Figure 3-2 and Figure 3-3 in Dillon (2018). The hydrostratigraphic cross-section depicted on Figure 3-2 extends from the river to the west, to the WMA northeast. The hydrostratigraphic cross-section depicted on Figure 3-3 shows the localized hydrostratigraphy, between the river to the west, to monitoring well nest 2, located up gradient and east of the WR-1.

Glacial Till (Basal Sand and Basal Till)

The Glacial Till unit is referred to as “basal sand” in the area of WR-1 (Dillon 2018) due to the increased sand content observed in this unit in other areas near the WR-1 (primarily the WMA). While there is some discontinuity in the basal sand (the unit was not observed at 15-6A or 16-8A to the west of WR-1), the unit extends broadly across the site, with decreasing permeability westwards, near the Winnipeg River.

Results of grain size analysis on samples from recently drilled boreholes in the vicinity of WR-1 indicated that the Glacial Till unit is primarily comprised of silt (content ranged from 26% to 56%), with the majority of remaining particles categorized as fine sand (15% to 32%), and clay (5% to 24%). Water content for this unit ranged from 9% to 27% (KGS 2016).

Glacio-Lacustrine Clay (Clay Till)

The basal sand is overlain by a clay till unit containing sand and silty sand seams. The lower portion of this unit is derived from the Glacial Till.

Results of grain size analysis on samples in the Glacio-Lacustrine Clay unit taken from the recently drilled boreholes in the vicinity of WR-1 indicated that this unit is primarily comprised of clay (content ranged from 4% to 76%) and silt (21% to 57%) with the majority of remaining particles categorized as fine sand (6% to 55%). Gravel content upwards of 7% to 9% was noted in some samples. Water content for this unit ranged from 26% to 59% (KGS 2016).

Glacio-lacustrine Clay and Surficial Interbedded Silt and Clay (Clay)

A glacio-lacustrine clay unit overlays the clay till unit throughout the LSA. This unit is transitional, with the lower portion more laminated with silty interbeds, and the upper portion more massive. A thin surficial interbedded silt and clay unit overlies these clays. These units have been grouped given their similar properties, and relative thinness of the surficial unit. This unit is inferred to be absent adjacent to the Winnipeg River due to the erosional drop in topography towards the river.

Results of grain size analysis on samples of this unit taken from the recently drilled boreholes in the vicinity of WR-1 indicated that this unit is primarily comprised of clay (content ranged from 44% to 92%), with the majority of remaining particles categorized as silt (6% to 55%). In all samples less than 5% of the material was categorized as having a

grain size equivalent to fine sand or larger. Water content for this unit ranged from 26% to 59% (KGS 2016).

2.3.4.2 Bedrock Geology

The 2016 field investigations identified shallow bedrock at depths varying between 14 and 19 m below ground surface, which is consistent with the undulating topography observed at surface outcrops in the area. Bedrock observed was consistent with local and regional bedrock geological records. Bedrock was observed to consist predominantly of feldspar-rich granite. Fractures were observed within the upper 10 m of bedrock. Stratigraphic cross-sections showing site stratigraphy extending from the bedrock wells installed near the WMA to the Winnipeg River are shown on Figure 3-2 and Figure 3-3 of Dillon (2018).

Previous drilling activities to bedrock at the WMA and the recent drilling activities both observed large boulders present within the sand aquifer that directly overlies the bedrock surface. The general pattern of the Lac du Bonnet Batholith, on which the WL site is located, is that the upper part of the rock mass consists of pink granite hosting moderately fractured rock and fracture zones with thin interspersed domains of slightly fractured rock (CNL 2021a). Fractures zones were noted between 20 and 150 m and between 395 to 400 m, with fractures generally absent outside of these zones. Elsewhere on the WL site, fracture frequency is generally consistent, with lower fracture frequency in the upper 300 m and a highly fractured zone present at depths in the 300 m to 400 m range. However, the uppermost zone of Precambrian bedrock (upper 10 m) and a second zone (20 m to 30 m) have been found to contain a higher frequency of fractures.

2.3.4.3 Hydrogeology

The river is assumed to provide stable hydrological boundaries on the west side of the WL site. Lateral groundwater flow across the site is predominantly in a westward direction in the basal unit, originating from the upland recharge area, and flowing westerly towards the main discharge area, the Winnipeg River.

The water table at the WL main campus is shallow and moderately replicates the surface topography. Groundwater flow in the WL area is predominantly in an east to west direction, originating from the topographic high recharge area and flowing toward the main discharge area, the Winnipeg River. The recharge and discharge locations along the groundwater flow path are controlled by climate, topography, and other hydraulic factors such as the variations in the permeability and/or thickness of the stratigraphic units. Horizontal groundwater flow is dominated by the more permeable basal sand unit immediately above the bedrock, and the fractured bedrock zones.

One zone of recharge, two zones of discharge, and two transitional areas have been identified for the WL property. The central discharge area has been identified at the WMA, the lagoon area was observed to be in a recharge position, and the landfill is situated in a primarily recharge condition due to its proximity to the uplands recharge area. The recharge and discharge conditions across the WL property are largely dependent on the properties

and flow conditions that occur in the basal (sand and till) units – such as unit thickness variability, lateral groundwater flow pattern, and hydraulic conductivity.

There is an upward component of groundwater flow from the basal sand unit into the overlying lacustrine clays in the WMA. At the WMA, the hydraulic heads at depth are nearly continuously greater than the elevation of the water table. Groundwater flows from depth toward the water table, and hence the WMA is located in a groundwater discharge area.

The upward discharge of groundwater observed at the WMA was not observed at the WR-1 site in the 2016 field program results. The data for the WL main campus suggest there is a horizontal component to groundwater flow through the basal sand unit and shallow bedrock, westward towards the Winnipeg River. As well there is evidence of a general downward component of groundwater flow through the overburden units. The upward flow in the WMA is attributed to the lower permeability and decreased dimension of the basal sand unit to the west of the WMA.

The lagoon area is between the WMA and the WL main campus to the north. Vertical downwards groundwater flow dominates over lateral flow at the water table at the lagoon. Lateral groundwater flow conditions are observed at both the water table and basal sand unit. Flow at the water table is radial from the lagoon cells and downwards to the deep zone, where it then moves laterally from east to west.

2.3.5 Hydrology

The WL is situated on the east bank of the Winnipeg River approximately 500 m to the west, and the Winnipeg River is the dominant hydrological feature of the area. The Winnipeg River flows from the Lake of the Woods and the English River system of Northwestern Ontario and drains to Lake Winnipeg located northwest of the WL site (Figure 1.0-1 in Golder 2021a).

The Winnipeg River is classified as a medium-sized lowland river. The total drainage basin of the Winnipeg River is approximately 150,000 km^2, although only about 4,000 km^2 are below the junction of the English River in the Province of Manitoba proper. A descent in ground elevation of 83 m from the Manitoba/Ontario border to Lake Winnipeg through a series of falls and rapids has resulted in hydroelectric development of the river. Six electric generation stations are present on the Winnipeg River, whose discharge rate is now largely controlled by these hydroelectric dams, which precludes any short-term correlation between precipitation and river flow. The Manitoba Hydro dams are at elevations of 275 m to the east, 273 m to the south, and 254 m to the west and north.

Near the WL site, the river is approximately 300 m wide, 7 m deep and flows in a northerly direction at a velocity of approximately 0.3 metres per second (m/s). Flow rates measured at the nearby Seven Sisters Falls Hydroelectric Generating Station (approximately 8 km upstream) typically vary between 600 to 1,800 m^3/s with a record low at 125 m^3/s and as high as 2,800 m^3/s (CNL 2016a).

2.3.6 Aquatic Habitat and Biota

The Winnipeg River contains a wide variety of fish species, including the following large bodied / predatory species: Walleye (*Sander vitreus*), Northern Pike (*Esox lucius*), White Sucker (*Catostomus commersonii*), Whitefish (*Coregonus clupeaformis*), Smallmouth Bass (*Micropterus dolomieu*), Mooneye (*Hiodon* spp.), and Lake Trout (*Salvelinus namaycush*) (AECL 2001). As well, Lake Sturgeon (*Acipenser fulvescens*) are found in the Winnipeg River and are a species at risk (COSEWIC 2017). Small bodied / foraging species are also present including numerous species of minnows.

Aquatic invertebrate studies conducted on the Winnipeg River in the early 1970s and mid-1990s reported many species of zooplankton and benthic fauna. Benthic fauna included protozoa, ostracods, nematodes, oligochaetes, leeches, mysids, crayfish, amphipods, mollusks, mussels and aquatic insects (AECL 2001).

Aquatic plants such as bulrushes, cattails and wild rice have been identified along the banks of the Winnipeg River. Although, wild rice is harvested in the region, the waters near WL do not support wild rice. The Winnipeg River also supports a diverse assemblage of algae (phytoplankton) (AECL 2001).

Gullies and ravines are found along the Winnipeg River. These gullies and ravines provide ideal habitat for beavers (*Castor canadensis*) and result in beaver ponds on-site. These ponds, however, are drained after a few years. The site also contains two sewage lagoons that support aquatic plants and animals. Man-made ditches that carry water during spring run-off are also present on the WL site but are not likely to provide an ideal aquatic habitat for plants and animals because they are dry in the summer (AECL 2001).

Aquatic receptor selection for the ecological risk assessment is discussed in the problem formulation for the post-closure assessment (Section 7.0).

2.3.7 Terrestrial Habitat and Biota

The terrestrial habitat consists of wetland areas to the east of the WL site and forest species and abandoned farm fields vegetated with grasses and shrubs to the west. Although black spruce (*Picea mariana*) is the common plant species in the easterly portions of the WL site, jack pine (*Pinus banksiana*) is also present in this area along a ridge of well drained sandy soil. The forest species to the west of the site consist of ash (*Fraxinux* sp.) and poplar (*Populus* sp.) growing in poorly drained clay plains (AECL 2001). Blueberries are common along the sides of the plant road south of WR-1.

Mammalian species that are common and widespread in the area include the snowshoe hare (*Lepus americanus*), American red squirrel (*Tamiasciurus hudsonicus*), meadow vole (*Microtus pennsylvanicus*), red fox (*Vulpes vulpes*) and white-tailed deer (*Odocoileus virginianus*). Not only is the white-tailed deer present on WL site, the white-tailed deer have also established a wintering area. The white-tailed deer is considered to be an important

species for the traditional communities and game species in the area (AECL 2001). Recently, moose have been sighted on the south-east portion of the WL property.

A bat survey conducted in 2015 at the WL site indicated that bats were not roosting within buildings at the site, but rather can be found roosting in the forested areas of the site.

Bird migratory staging areas are present on and near the site. The Winnipeg river is an important migratory corridor for many bird species including: common loon (*Gavia immer*), red-necked grebe (*Podiceps grisengena*), horned grebe (*Podiceps auritus*), double-crested cormorant (*Phalacrocorax auritus*), American white pelican (*Pelecanus erythrorhynchos*), Bonaparte's gull (*Chroicocephalus philadelphia*), common tern (*Sterna hirundo*), Caspian tern (*Hydroprogne caspia*), lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*) and bald eagle (*Haliaeetus leucocephalus*).

Terrestrial receptor selection for the ecological risk assessment is discussed in the problem formulations for the closure and post-closure assessments (Sections 6.0 and 7.0).

2.3.8 Human Land Use

In Section 6.8 of the EIS there are further details on land uses in the WL area. Briefly, WL site is held by a crown corporation and is restricted for security and safety. The WL site occupies areas designated by Pinawa for agricultural, industrial, institutional, and natural area land uses. On the west side of the Winnipeg River, CNL permits agricultural use within the WL site. To the north on the east side of the Winnipeg River (downstream) is the Town of Lac du Bonnet and east on the north side of the Winnipeg River (upstream) is the Town of Pinawa. North and west of the WL site is zoned as agricultural, although no new livestock operations are permitted. Other areas west of the Winnipeg River have been designated for mixed use, including residential and rural residential uses. Rural residential zones are low-density residential developments that use on-site waste management facilities, while residential areas allow for single-family and multi-family dwellings. There is conditional allowance of commercial resorts in these zones by the Town Lac du Bonnet. To the south and west of the WL site is the Agassiz Provincial Forest. This forest was established for sustainable timber supply and is used for peat moss extraction and snowmobile trails. Manitoba Infrastructure has quarry withdrawals on the northeast boundary of the WL site. South of the WL site is Pinawa Provincial Park and Whitemouth Falls Provincial Park. East of the WL site is Whiteshell Provincial Park and Pinawa Dam Provincial Park. North of the WL site is Lee River Wildlife Management Area. There are multiple water users in the area with licences to take water from the Winnipeg River.

2.4 Uncertainty in Site Characterization

The WL site is considered to be well-characterized. No residual uncertainties in the site characterization have been identified.

3.0 SOURCE TERM CHARACTERIZATION

3.1 Closure Phase

Normal Evolution scenarios represent the expected emissions and conditions for closure and post-closure phases of the Project. As identified in Section 6.2 of the EIS (Golder, EcoMetrix, InterGroup 2022), activities associated with closure activities will result in release of atmospheric contaminants into the environment; however, releases to surface water are not expected.

3.1.1 Radiological Releases

The radionuclides that are considered for the closure phase are primarily those that have been identified in the DRL Report (CNL 2016b) and the source term characterization report (CNL 2020a). These radionuclides have been found in WL's airborne effluent or are reasonably expected to be found in the airborne effluent during closure activities.

Radionuclides will be released to the atmosphere during the closure phase – during grouting and demolition activities. Additionally, some above-grade systems and structures have existing radiological and hazardous contamination, such as the Primary Heat Transport (PHT) system. The PHT will be disassembled and above grade portions relocated below grade prior to grouting (CNL 2021b). During grouting, radionuclides remaining may be released from the reactor core and biological shield.

During demolition of above-grade structures after grouting, it is expected that there will be negligible release of radionuclides to the atmosphere. It is expected that demolition of above grade structures will occur for 2 years after grouting is complete. This includes removal of the non-grouted building structures, equipment, and services contained within 1 m of the building footprint, including the non-grouted 600 Level and 500 Level flooring, the above-grade portion of the active ventilation system, and remaining slowpoke demonstration reactor (SDR) materials (CNL 2021b). CNL intends to characterize, survey, and decontaminate or immobilize any residual contamination prior to demolition to ensure that there is negligible release of radionuclides to the environment. Therefore, after grouting, contamination will be below grade and no release and subsequent exposure modelling has been performed for the demolition post grouting phase.

As identified in Section 6.2 of the EIS (Golder, EcoMetrix, InterGroup 2022), the Project activities associated with stages 1 to 3 of the closure phase (Table 3-1) were considered to represent the most conservative emission scenarios. The activities associated with these stages include: preparation for ISD, grouting of below grade structure and systems, and removal of above grade WR-1 structures and systems. As shown in Table 3-1 grouting and demolition are the main activities associated with potential radiological release to the atmospheric environment. It was assumed that radionuclides would be released as particulate matter (suspended particulate matter - SPM, particles nominally smaller than

10 µm in diameter - PM_{10}, and particles nominally smaller than 2.5 µm in diameter - $PM_{2.5}$); therefore, the emission rates presented in Section 6.2 of the EIS are relevant for assessment of maximum and average scenarios during the closure phase, as shown in Table 3-2.

Table 3-1: Project Activities, Components and Emission Sources during Closure

Project Stage	Project Activity	Duration	Project Component	Potential Rad Release
1	Preparation for ISD	2022 to 2024	Create pathways between rooms	-
			Batch mixing plant	-
			Demolition of above-grade portion of primary heat transport system (PHT)	X
2	Grouting of below grade structures and systems	2023	Fill below grade areas with grout (multiple lifts of grouting pours)	X
3	Removal of above grade WR-1 structures and systems	2023 to 2024	Demolition of main reactor hall, 50T reactor hall bridge crane, and ventilation stack	-
			Removal of hazardous waste	-
			Recycling of materials	-
			Disposal of asbestos at the WL landfill	-

Table 3-2: Maximum and Average Particulate Matter Emission Rates

Project Stage	Project Activity	Project Component	Emission Source Type	Scenario	Daily Emission Rate (g/s)[1]		
					SPM	PM_{10}	$PM_{2.5}$
2	Grouting of below grade structures and systems	Fill below grade areas with grout (multiple lifts of grouting pours)	Material Handling	Max	8.02E-03	3.79E-03	5.74E-04
				Avg	4.25E-03	2.01E-03	3.04E-04
1 and 3	Removal of above grade WR-1 structures and systems	Demolition of PHT Demolition of main reactor hall, above grade portion of, 50T reactor hall bridge crane, and ventilation stack	Demolition	Max	1.83E-01	1.83E-01	1.83E-02
				Avg	4.81E-02	4.81E-02	4.81E-03

Note:
1. Daily emission rates are obtained from Tables 6.2.1-11 and 6.2.1-12 in Golder, EcoMetrix, InterGroup (2022)

The WR-1 structure has 7 levels – levels 100 to 500 are below grade and levels 600 to 700 are above grade. As part of ISD, the below-grade reactor systems, components and structures will be grouted in place. The above-grade structures will be demolished and either placed below-grade or disposed of appropriately. An engineered cover will then be constructed above the below-grade structure (CNL 2021b). The main reactor floor is located at grade (Level 600) and the building extends 18.5 m below grade (Levels 100 to 500) (CNL 2021b). An overall view of the WR-1 is shown in Figure 3-1.

The source of radionuclides in WR-1 is from activation products, corrosion products, fission products and actinides, and radionuclides resulting from surface contamination during reactor operations. Activation products (mainly C-14, Cl-36, Fe-55, Ni-63, Ni-59, Co-60, and Nb-94) would be found mainly in fuel channels, calandria vessel, thermal shields, biological shield, and structures inside the reactor vault. Corrosion products (Fe-55, Co-60) produced in the primary heat transport system (PHT) are minimal due to use of organic coolant which reduces corrosion compared to water-based coolants. Fission products and actinides result from fuel failures releasing these products into the PHT system. The main fission products of interest are Sr-90 and Cs-137 and the main actinides of interest are Pu-238, Pu-239, Pu-240, Pu-241, and Am-241. Surface contamination results from spills and leaks and handling of failed fuel during operations.

The highest activities of radionuclides expected to be present at the WR-1 remain primarily in the reactor core, with smaller inventories of radionuclides in the reactor biological shield, and PHT system. Radionuclide inventories were originally characterized in 2016 and then further work was performed in 2017 and 2018 to address data gaps and further quantify remaining radionuclide content in WR-1. Both estimates are provided in the CNL (2020a) source term characterization report. The overall conclusion was that estimates based on historical work are more conservative compared to recent sampling and validation work; therefore, the bounding estimates were used.

The location of the reactor core and associated shielding is shown in Figure 3-2. The major components of the reactor core are the calandria, calandria tubes, thermal shields, and fuel channels. No fuel is remaining in the reactor core. As shown in Table 3-3, the dominant radionuclides currently associated with the reactor core include: C-14, Fe-55, Co-60, Ni-59, Ni-63, Nb-94, and Ag-108m. The radionuclide inventory estimates for 10, 30, and 50 years following shutdown are presented in Table 3-4.

The reactor biological shield is comprised of concrete (ilmenite) shielding approximately 7 feet thick. Based on Figure 3-2, the biological shield is below grade and will not be demolished during closure. As shown in Table 3-3, the dominant radionuclides associated with the biological shield include: C-14, Cl-36, Ca-41, Ni-63, Co-60, Eu-152, and Ag-108m . The radionuclide inventory estimates for 10, 30, and 50 years following shutdown are presented in Table 3-5.

During operation, the PHT removed heat from the reactor core. It consisted of the A, B, and C circuits, where the A and B circuits are located in rooms 506 and 602 and the C circuit was removed during Phase 1 decommissioning. The above-grade portion of the

PHT (anything at Level 600) will be demolished during closure, prior to grouting (see Figure 3-3). As shown in Table 3-3, the dominant radionuclides associated with the PHT include: Cs-137, Sr-90, Co-60 as well as fission products and actinides. CNL (2020a) provides estimates for fission products and actinides released into the PHT from fuel failure events (Table 17 in CNL 2020a) and a 1994 radionuclide inventory estimate in the PHT (Table 19 in CNL 2020a). Since the estimated radioactivity from fuel failure events released into the PHT is higher than the inventory estimated in the PHT, the estimates from fuel failure events is used as a conservative estimate. The 1994 inventory in the PHT for Co-60 is used since Co-60 is not provided in the fuel failure events data. The radionuclide inventory estimates for 10, 30, and 50 years following shutdown are presented in Table 3-6. 30 years following shutdown is appropriate for the closure phase since closure will start approximately 30 years after reactor shutdown in 1985.

Heavy water was used in the helium and heavy water system as a moderator and a coolant to remove heat from the calandria vessel and tubes. Helium was used as a cover gas to prevent air and water vapour from entering the heavy water system (CNL 2020a). The helium and heavy water system was drained in 1988 and dry-out commenced in 1990; however, there is contamination remaining (particularly tritium although low levels of C-14 are present). The majority of the helium and heavy water system is located at Level 100 (CNL 2021b). Under existing conditions, the system is purged through air flow to remove any additional tritium in the system. The estimated release rates of tritium during the closure phase are discussed in Section 3.1.1.3.

Table 3-3: Radionuclides Associated with Main Systems and Components at WR-1

System/Component	Radionuclide
Reactor Core	C-14, Fe-55, Co-60, Ni-59, Ni-63, Nb-94, Ag-108m
PHT	Cs-137, Sr-90, Co-60, (small amounts of Nb-94, Zr-95, Sb-125, Eu-152, Ra-226, Am-241), Pu-238, Pu-239, Pu-240, Pu-241, Tc-99, I-129, Cm-244, Ag-108m, U-235, U-238
Biological Shield	C-14, Cl-36, Ca-41, Ni-63, Co-60, Eu-152
Heavy Water and Helium System	Tritium, C-14
Corrosion products	C-14, Cl-36, Fe-55, Ni-63, Ni-59, Co-60, Nb-94
Surface contamination	Cs-137, Sr-90, Co-60

Table 3-4: Estimated Radionuclide Inventory in Reactor Core Following Shutdown (Bq)

Radionuclide	$t_{1/2}$ (years)	10 years[1]	30 years[2]	50 years[1]
C-14	5730	3.00E+12	3.00E+12	3.00E+12
Fe-55	2.7	3.00E+15	1.77E+13	1.00E+11
Co-60	5.3	1.90E+15	1.39E+14	9.70E+12
Ni-59	76000	8.30E+12	8.30E+12	8.30E+12

Radionuclide	$t_{1/2}$ (years)	10 years[1]	30 years[2]	50 years[1]
Ni-63	100	1.10E+15	9.58E+14	8.60E+14
Nb-94	20300	3.00E+12	3.00E+12	3.00E+12
Ag-108m	438	6.18E+06	5.99E+06	4.98E+06

Notes:
1. Data obtained from Table 12 and 13 in CNL 2020a for 10 and 50 years.
2. Data for 30 years was estimated from 10 years and half-life of radionuclide.

Table 3-5: Estimated Radionuclide Inventory in Biological Shield Following Shutdown (Bq)

Radionuclide	$t_{1/2}$ (years)	10 years[1]	30 years[2]	50 years[1]
Cl-36	3.00E+05	4.20E+03	4.20E+03	4.20E+03
Ca-41	1.00E+05	1.40E+08	1.40E+08	1.40E+08
Ni-63	100	6.70E+08	5.83E+08	5.10E+08
C-14	5730	6.20E+07	6.20E+07	6.20E+07
Co-60	5.3	5.50E+10	4.02E+09	2.80E+08
Eu-152	13.5	2.00E+09	7.16E+08	2.50E+08

Notes:
1. Data obtained from Table 15 in CNL 2020a for 10 and 50 years.
2. Data for 30 years was estimated from 10 years and half-life of radionuclide.

Table 3-6: Estimated Radionuclide Inventory in Primary Heat Transport System Following Shutdown (Bq)

Radionuclide	$t_{1/2}$ (years)	10 years	30 years	50 years
Sr-90	28.8	5.10E+11	3.10E+11	1.90E+11
Cs-137	30.2	7.60E+11	4.80E+11	3.00E+11
Eu-154	8.6	1.90E+10	3.90E+09	8.10E+08
Eu-155	4.8	7.90E+09	4.80E+08	2.90E+07
Tc-99	2.11E+05	1.30E+08	1.30E+08	1.30E+08
I-129	1.57E+07	2.80E+05	2.80E+05	2.80E+05
U-235	7.0E+07	5.76E+05	5.76E+05	5.76E+05
U-238	4.5E+09	1.24E+07	1.24E+07	1.24E+07
Np-237	2.14E+06	9.40E+05	1.10E+06	1.20E+06
Np-239	0.0065	1.90E+07	1.90E+07	1.90E+07
Pu-238	88	2.90E+09	2.50E+09	2.10E+09
Pu-239	24110	6.10E+09	6.10E+09	6.10E+09
Pu-240	6561	8.70E+09	8.70E+09	8.70E+09
Pu-241	14	5.30E+11	2.00E+11	7.70E+10
Am-241	432	1.10E+10	2.10E+10	2.50E+10
Am-243	7370	1.90E+07	1.90E+07	1.90E+07
Cm-244	18.1	4.40E+08	2.10E+08	9.60E+07

Radionuclide	$t_{1/2}$ (years)	10 years	30 years	50 years
Co-60[1]	5.3	3.33E+09	2.43E+08	1.78E+07
Ag-108m[1]	438	-	1.62E+06	1.50E+06

Note:
1. Data obtained from Table 17 in CNL 2020a, except for Co-60 which was obtained from Table 19 in CNL 2020a – activity at 10, 30, and 50 years was estimated from activity at t_0 = 1.23E10 Bq and half-life of 5.3 years. Ag-108m was obtained from Table 20 in CNL 2020a – activity estimated at 30 years and at 50 years using a half-life of 438 years.

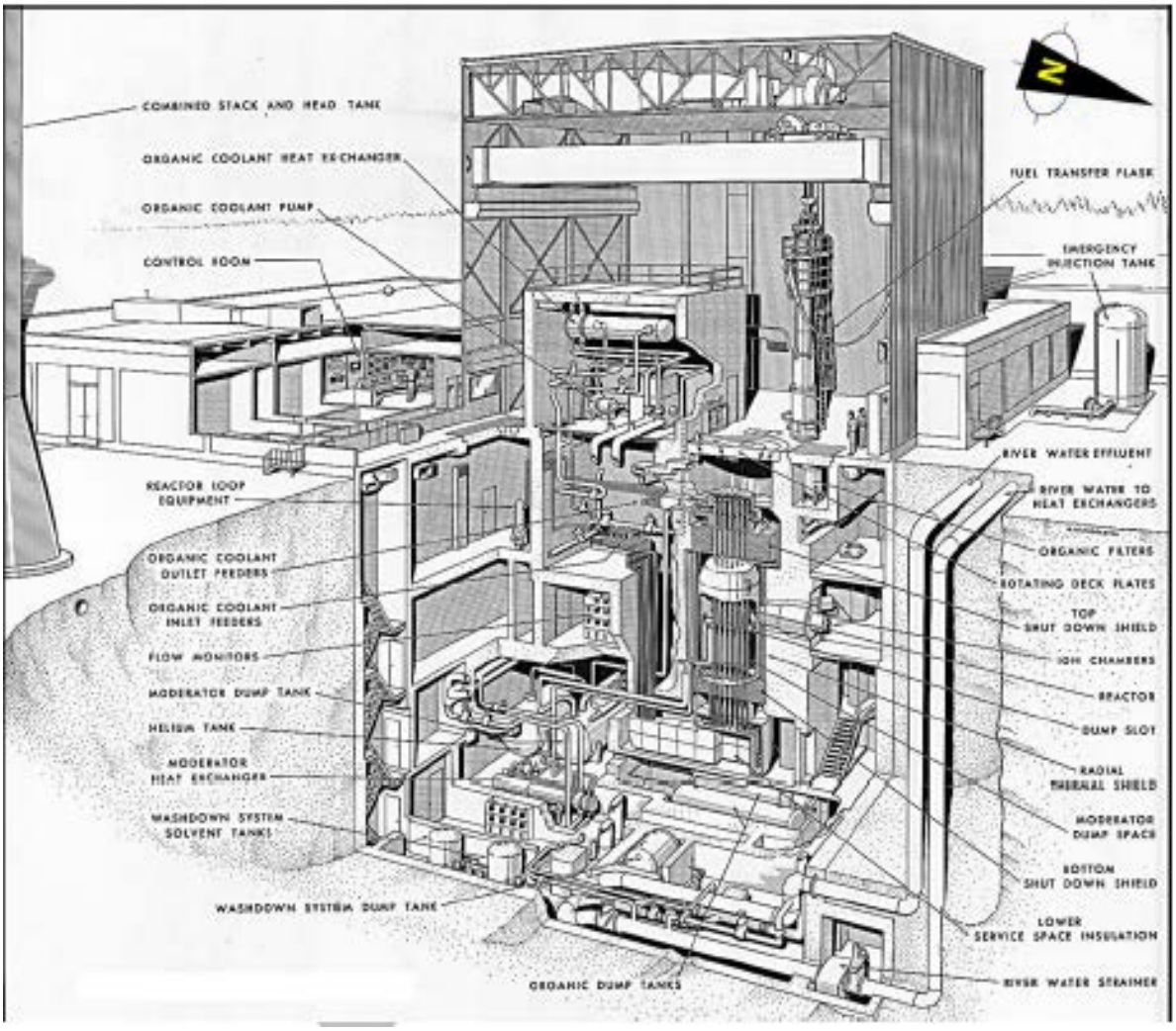


Figure 3-1: WR-1 Overview (CNL 2016a)

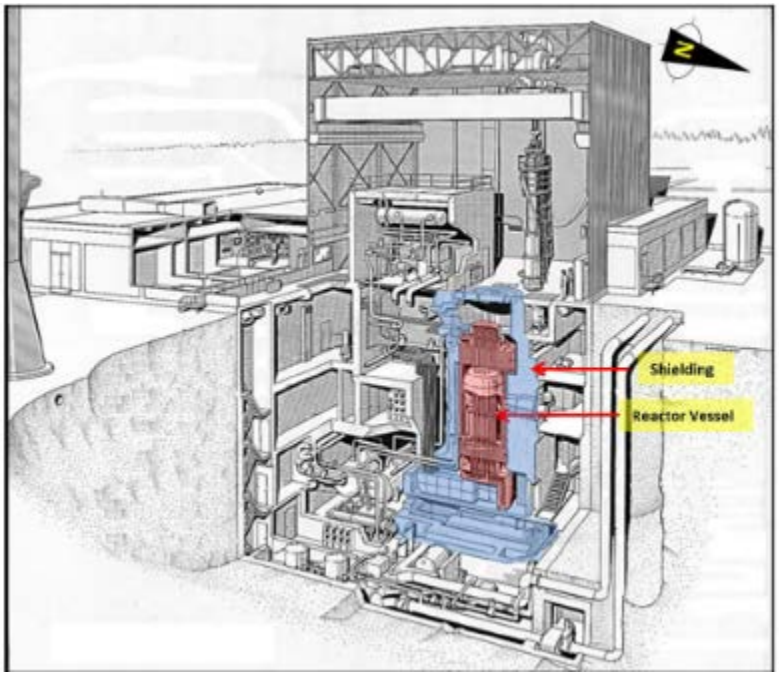


Figure 3-2: Reactor Vessel and Shielding (CNL 2016a)

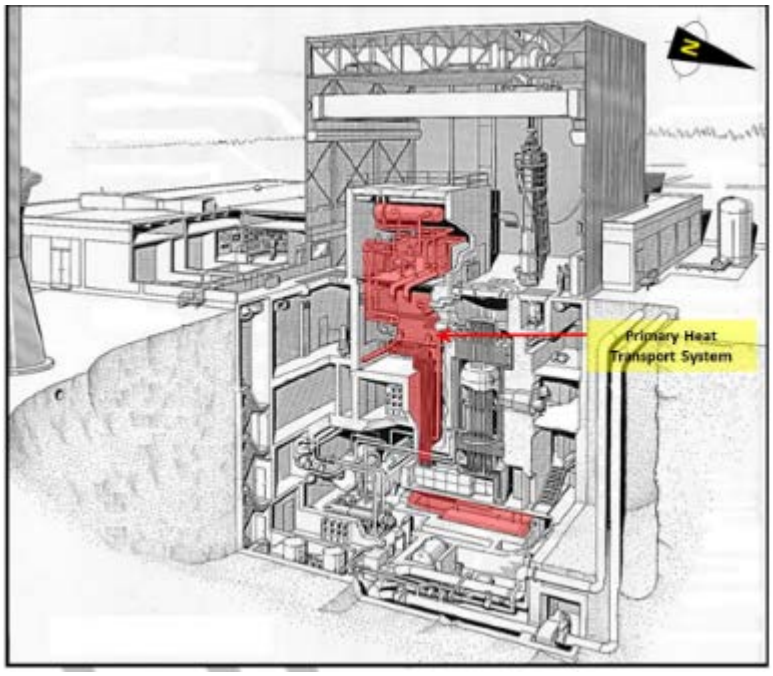


Figure 3-3: Primary Heat Transport System (CNL 2016a)

3.1.1.1 Release during Demolition Prior to Grouting

Prior to grouting, the above-grade portion of the PHT system will be dismantled and relocated below grade. The duration of demolition activities prior to grouting is dependent on minimizing worker exposure to radionuclides while carrying out work activities. The

anticipated radioactivity levels will be determined during system characterization and will inform for how long the demolition activities need to occur. If contamination levels are low, the duration of demolition and relocation to the ISD envelope could take approximately 1 to 2 months; however, as a conservative estimate it has been assumed that this is carried out over a 6-month period.

The remaining components of the PHT system that will be placed below grade are the two heat exchangers (each are 5.1 m long; 6.6 Mg; 1.5 m^3) and the remaining two outlet headers (each are 2.7 m long; 3.4 Mg; 0.1 m^3) (CNL 2021b). Therefore, the mass of the PHT to be disassembled is 20 Mg. The total mass of the remaining components of the PHT (above and below grade) is 99.3 Mg (Appendix L of CNL 2021b, all items identified as Phase 1 Decommissioning have already been previously removed); therefore, the above-grade portion of the PHT represents approximately 20.1% of the total remaining PHT mass.

It was assumed that the above-grade inventory of each radionuclide (20.1% of the PHT inventory) is dispersed over the mass of the demolition material (20 Mg). Therefore, the maximum and average particulate release rates in g/s (Table 6.2.1-11 and Table 6.2.1-12, respectively in the EIS (Golder, EcoMetrix, InterGroup 2022)) were multiplied by 20.1% of the radionuclide inventory from the PHT at year 30 (Tables 17 and 19 in CNL 2020a) in Bq/g to estimate the release rate per radionuclide (in Bq/s) that could be expected during demolition activities in the closure phase. As shutdown occurred in 1985 and decommission activities will take place 30 to 40 years after, the closest year available for the inventory was used. For the PHT this was year 30.

This assumption is conservative in that the entire above-grade portion of the inventory of radionuclides is made available for release with dust particulate. In reality, much of the inventory will be fixed on surfaces of WR-1 structures. In addition, decontamination practices and contamination control techniques provide mitigation. In addition, dust or gaseous emissions are expected to be captured in the remnant organics (oil), within the system. In addition, the structure is made of steel not concrete, which also inhibits the collection of dust and particulates on the PHT system.

The estimation assumes that the radionuclide inventory is mixed evenly with the demolished material. The concentration in the demolition material and the release rates are presented in Table 3-7. The release rates, assuming the radionuclides are released as SPM, PM_{10} or $PM_{2.5}$ are shown; however, PM_{10} is generally associated with demolition activities.

Table 3-7: Estimated Radionuclide Release Rate from Primary Heat Transport System

Rad	Concentration in Demolition Material (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
Sr-90	3.12E+03	1.15E+02	3.02E+01	1.15E+02	3.02E+01	1.15E+01	3.02E+00
Cs-137	4.83E+03	1.78E+02	4.68E+01	1.78E+02	4.68E+01	1.78E+01	4.68E+00
Eu-154	3.93E+01	1.45E+00	3.80E-01	1.45E+00	3.80E-01	1.45E-01	3.80E-02
Eu-155	4.83E+00	1.78E-01	4.68E-02	1.78E-01	4.68E-02	1.78E-02	4.68E-03
Tc-99	1.31E+00	4.83E-02	1.27E-02	4.83E-02	1.27E-02	4.83E-03	1.27E-03
I-129	2.82E-03	1.04E-04	2.73E-05	1.04E-04	2.73E-05	1.04E-05	2.73E-06
U-235	5.80E-03	2.14E-04	5.62E-05	2.14E-04	5.62E-05	2.14E-05	5.62E-06
U-238	1.25E-01	4.60E-03	1.21E-03	4.60E-03	1.21E-03	4.60E-04	1.21E-04
Np-237	1.11E-02	4.08E-04	1.07E-04	4.08E-04	1.07E-04	4.08E-05	1.07E-05
Np-239	1.91E-01	7.05E-03	1.85E-03	7.05E-03	1.85E-03	7.05E-04	1.85E-04
Pu-238	2.52E+01	9.28E-01	2.44E-01	9.28E-01	2.44E-01	9.28E-02	2.44E-02
Pu-239	6.14E+01	2.26E+00	5.95E-01	2.26E+00	5.95E-01	2.26E-01	5.95E-02
Pu-240	8.76E+01	3.23E+00	8.49E-01	3.23E+00	8.49E-01	3.23E-01	8.49E-02
Pu-241	2.01E+03	7.42E+01	1.95E+01	7.42E+01	1.95E+01	7.42E+00	1.95E+00
Am-241	2.11E+02	7.79E+00	2.05E+00	7.79E+00	2.05E+00	7.79E-01	2.05E-01
Am-243	1.91E-01	7.05E-03	1.85E-03	7.05E-03	1.85E-03	7.05E-04	1.85E-04
Cm-244	2.11E+00	7.79E-02	2.05E-02	7.79E-02	2.05E-02	7.79E-03	2.05E-03
Co-60	2.45E+00	9.03E-02	2.37E-02	9.03E-02	2.37E-02	9.03E-03	2.37E-03
Am-108m	1.63E-02	6.01E-04	1.58E-04	6.01E-04	1.58E-04	6.01E-05	1.58E-05
Total	**1.04E+04**	**3.84E+02**	**1.01E+02**	**3.84E+02**	**1.01E+02**	**3.84E+01**	**1.01E+01**

Note:
Red shading indicates values used in the ERA

3.1.1.2 Release during Grouting

While the grouting of below grade structures is assumed to take 3 to 5 months on a schedule of 5 days per week, it has been assumed that grouting will occur for 1 year. Over that period, the total volume of grout used will be 10,000 m^3. Based on a grout density of 2190 kg/m^3, the total mass of grout used during this phase will be 21,900 tonnes. The maximum and average daily mass of grout that will be used is 2168 and 1150 tonnes/day respectively (Table 4 in Appendix 6.2-2 of the EIS (Golder, EcoMetrix, InterGroup 2022)). As a conservative estimate for developing the source term for the ERA, the total radionuclide inventory was assumed to be distributed over the total mass of grout to calculate a radionuclide concentration in grout. This is conservative, because much of the inventory will not be readily dispersed in this manner.

The estimated radionuclide inventory was obtained from CNL (2020a) for the reactor core (Table 12), biological shield (Table 15) and the PHT system (Tables 17, 19 and 20), and active ventilation system, approximately 30 to 40 years following shutdown. For the active ventilation system total surface contamination was assumed to be 40 Bq/cm^2. CNL determined the radionuclide specific surface contamination levels based on radionuclide inventory from Table 17 in CNL (2020a) at 40 years, the closest year available. The total surface area of active ventilation system that will remain below grade was estimated as 665,830,000 cm^2; therefore, the total activity is 2.66E+10 Bq.

It was assumed that the below-grade inventory of each radionuclide is dispersed over the mass of the grouting material. Therefore, the maximum and average particulate release rates in g/s (Table 6.2.1-11 and Table 6.2.1-12 in the EIS (Golder, EcoMetrix, InterGroup 2022)) were multiplied by the estimated radionuclide concentration in grout, to obtain a release rate in Bq/s. The inventory from the reactor core, biological shield, active ventilation system, and remaining 79.9% of radionuclide inventory from the PHT system at year 30 (in Bq/g) to estimate the radionuclide concentration. It was assumed in Section 3.1.1.1 that 20.1% of the PHT activity was released during demolition prior to grouting.

This assumption is conservative in that the entire inventory of radionuclides is made available for release with dust particulate. In reality, much of the inventory will be fixed on surfaces of WR-1 structures. In addition, decontamination practices and contamination control techniques provide mitigation. The modelling is also conservative in that the maximum and average dust release rates during grouting are assumed to occur over the entire one-year grouting period, even though grouting is expected to occur for only 109 days over this period.

Estimation of maximum and average release rates assumes that the radionuclide inventory is mixed evenly with the grout. The concentration in the grout and the release rates are presented in Table 3-8 to Table 3-11. The release rate, assuming the radionuclides are released as SPM, PM_{10} or $PM_{2.5}$ are shown; however, assuming radionuclides are released as SPM gives the most conservative release rate for radionuclides. The PM_{10} and $PM_{2.5}$ fractions are included in the SPM. While only these smaller fractions may be available for inhalation, the assessment assumes that the total airborne concentration is available.

Table 3-8: Estimated Radionuclide Release Rate from Reactor Core

Rad	Concentration in Grout (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
C-14	1.4E+02	1.1E+00	5.8E-01	5.2E-01	2.7E-01	7.8E-02	4.2E-02
Fe-55	8.1E+02	6.5E+00	3.4E+00	3.1E+00	1.6E+00	4.6E-01	2.5E-01
Co-60	6.3E+03	5.1E+01	2.7E+01	2.4E+01	1.3E+01	3.6E+00	1.9E+00
Ni-59	3.8E+02	3.0E+00	1.6E+00	1.4E+00	7.6E-01	2.2E-01	1.2E-01
Ni-63	4.4E+04	3.5E+02	1.9E+02	1.7E+02	8.8E+01	2.5E+01	1.3E+01
Nb-94	1.4E+02	1.1E+00	5.8E-01	5.2E-01	2.8E-01	7.9E-02	4.2E-02

Ag-108m	2.7E-04	2.2E-06	1.2E-06	1.0E-06	5.5E-07	1.6E-07	8.3E-08
Total	5.2E+04	**4.13E+02**	**2.19E+02**	1.95E+02	1.04E+02	2.96E+01	1.57E+01

Note:
Red and bolded text indicates values used in the ERA

Table 3-9: Estimated Radionuclide Release Rate from Biological Shield

Rad	Concentration in Grout (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
Cl-36	1.9E-07	1.5E-09	8.2E-10	7.3E-10	3.9E-10	1.1E-10	5.8E-11
Ca-41	6.4E-03	5.1E-05	2.7E-05	2.4E-05	1.3E-05	3.7E-06	1.9E-06
Ni-63	2.7E-02	2.1E-04	1.1E-04	1.0E-04	5.4E-05	1.5E-05	8.1E-06
C-14	2.8E-03	2.3E-05	1.2E-05	1.1E-05	5.7E-06	1.6E-06	8.6E-07
Co-60	1.8E-01	1.5E-03	7.8E-04	7.0E-04	3.7E-04	1.1E-04	5.6E-05
Eu-152	3.3E-02	2.6E-04	1.4E-04	1.2E-04	6.6E-05	1.9E-05	9.9E-06
Total	2.5E-01	**2.02E-03**	**1.07E-03**	9.56E-04	5.07E-04	1.45E-04	7.67E-05

Note:
Red and bolded text indicates values used in the ERA

Table 3-10: Estimated Radionuclide Release Rate from Primary Heat Transport System

Rad	Concentration in Grout (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
Sr-90	1.1E+01	9.1E-02	4.8E-02	4.3E-02	2.3E-02	6.5E-03	3.4E-03
Cs-137	1.8E+01	1.4E-01	7.4E-02	6.6E-02	3.5E-02	1.0E-02	5.3E-03
Eu-154	1.4E-01	1.1E-03	6.0E-04	5.4E-04	2.9E-04	8.2E-05	4.3E-05
Eu-155	1.8E-02	1.4E-04	7.4E-05	6.6E-05	3.5E-05	1.0E-05	5.3E-06
Tc-99	4.7E-03	3.8E-05	2.0E-05	1.8E-05	9.5E-06	2.7E-06	1.4E-06
I-129	1.0E-05	8.2E-08	4.3E-08	3.9E-08	2.1E-08	5.9E-09	3.1E-09
U-235	2.1E-05	1.7E-07	8.9E-08	8.0E-08	4.2E-08	1.2E-08	6.4E-09
U-238	4.5E-04	3.6E-06	1.9E-06	1.7E-06	9.1E-07	2.6E-07	1.4E-07
Np-237	4.0E-05	3.2E-07	1.7E-07	1.5E-07	8.1E-08	2.3E-08	1.2E-08
Np-239	6.9E-04	5.6E-06	2.9E-06	2.6E-06	1.4E-06	4.0E-07	2.1E-07
Pu-238	9.1E-02	7.3E-04	3.9E-04	3.5E-04	1.8E-04	5.2E-05	2.8E-05
Pu-239	2.2E-01	1.8E-03	9.5E-04	8.4E-04	4.5E-04	1.3E-04	6.8E-05
Pu-240	3.2E-01	2.5E-03	1.3E-03	1.2E-03	6.4E-04	1.8E-04	9.6E-05
Pu-241	7.3E+00	5.8E-02	3.1E-02	2.8E-02	1.5E-02	4.2E-03	2.2E-03
Am-241	7.7E-01	6.1E-03	3.3E-03	2.9E-03	1.5E-03	4.4E-04	2.3E-04
Am-243	6.9E-04	5.6E-06	2.9E-06	2.6E-06	1.4E-06	4.0E-07	2.1E-07

Rad	Concentration in Grout (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
Cm-244	7.7E-03	6.1E-05	3.3E-05	2.9E-05	1.5E-05	4.4E-06	2.3E-06
Co-60	8.9E-03	7.1E-05	3.8E-05	3.4E-05	1.8E-05	5.1E-06	2.7E-06
Ag-108m	5.9E-05	4.7E-07	2.5E-07	2.2E-07	1.2E-07	3.4E-08	1.8E-08
Total	3.8E+01	**3.0E-01**	**1.6E-01**	1.4E-01	7.6E-02	2.2E-02	1.1E-02

Note:
Red and bolded text indicates values used in the ERA

Table 3-11: Estimated Radionuclide Release Rate from Active Ventilation System

Rad	Concentration in Grout (Bq/g)	Release Rate (Bq/s)					
		SPM		PM_{10}		$PM_{2.5}$	
		Max	Avg	Max	Avg	Max	Avg
Sr-90	3.8E-01	3.0E-03	1.6E-03	1.4E-03	7.6E-04	2.2E-04	1.2E-04
Cs-137	5.8E-01	4.6E-03	2.4E-03	2.2E-03	1.2E-03	3.3E-04	1.7E-04
Eu-154	2.7E-03	2.2E-05	1.2E-05	1.0E-05	5.5E-06	1.6E-06	8.3E-07
Eu-155	1.8E-04	1.5E-06	7.7E-07	6.9E-07	3.7E-07	1.0E-07	5.5E-08
Tc-99	2.0E-04	1.6E-06	8.4E-07	7.5E-07	4.0E-07	1.1E-07	6.0E-08
I-129	4.2E-07	3.4E-09	1.8E-09	1.6E-09	8.5E-10	2.4E-10	1.3E-10
U-235	8.7E-07	7.0E-09	3.7E-09	3.3E-09	1.8E-09	5.0E-10	2.7E-10
U-238	1.9E-05	1.5E-07	8.0E-08	7.1E-08	3.8E-08	1.1E-08	5.7E-09
Np-237	1.7E-06	1.3E-08	7.1E-09	6.3E-09	3.3E-09	9.6E-10	5.1E-10
Np-239	2.9E-05	2.3E-07	1.2E-07	1.1E-07	5.8E-08	1.7E-08	8.7E-09
Pu-238	3.5E-03	2.8E-05	1.5E-05	1.3E-05	7.0E-06	2.0E-06	1.1E-06
Pu-239	9.2E-03	7.4E-05	3.9E-05	3.5E-05	1.9E-05	5.3E-06	2.8E-06
Pu-240	1.3E-02	1.1E-04	5.6E-05	5.0E-05	2.6E-05	7.6E-06	4.0E-06
Pu-241	2.0E-01	1.6E-03	8.4E-04	7.5E-04	4.0E-04	1.1E-04	6.0E-05
Am-241	3.6E-02	2.9E-04	1.5E-04	1.4E-04	7.3E-05	2.1E-05	1.1E-05
Am-243	2.9E-05	2.3E-07	1.2E-07	1.1E-07	5.8E-08	1.7E-08	8.7E-09
Cm-244	2.1E-04	1.7E-06	9.0E-07	8.0E-07	4.3E-07	1.2E-07	6.4E-08
Total	1.2E+00	**9.8E-03**	**5.2E-03**	4.6E-03	2.4E-03	7.0E-04	3.7E-04

Note:
Red and bolded text indicates values used in the ERA

3.1.1.3 Release of Tritium

It is expected that tritium (HTO) will be released from the helium and heavy water system during the majority of the closure activities at a rate similar to the maximum and average tritium release rates from the WR-1 Building from 2011 to 2019. A summary of maximum and average release rates from 2011 to 2019 is provided in Table 3-12 (CNL 2020b, 2019a, 2018b, 2017a, 2016c, 2015a; AECL 2014, 2013, 2012). The average release rate for tritium from 2011 to 2019 was 1.11E+09 Bq/week (1.84E+03 Bq/s). This is appropriate for the tritium release rate during demolition prior to grouting.

However, the tritium release rate to the atmosphere is expected to increase during activities associated with grouting due to vibration and heating of structures and systems, increased air flow, or venting of residual tritium. This assumption is based on a study CNL conducted on tritium releases during characterization activities associated with radiological characterization in the helium and heavy water system in 2015 (CNL 2015b).

As shown in Figure 3-4, the tritium release rate increased during characterization due to vibration and heating of the surface, and only began to decrease after characterization activities ended (CNL 2015b). The maximum weekly tritium release rate observed during characterization activities was approximately 1.28E+10 Bq/week, and is appropriate to use as an expected release rate during grouting activities during the closure phase. Tritium during characterization studies was measured as total tritium. It has been assumed that tritium is in the form of HTO (tritiated water vapour) – this is a conservative assumption since HTO partitions better to other media than HT (elemental tritium). As indicated in CSA N288.1-14, HT is weakly absorbed by the body; therefore, any doses resulting from release of HT are due to the very small fraction, approximately 0.004% of HT that is converted to HTO in the human body.

It has been assumed that tritium will be released at the maximum release rate of 1.28E+10 Bq/week for the entire 1-year duration of the grouting phase, although vibrating and heating activities are not likely to occur for the full duration. A summary of the maximum and average predicted atmospheric tritium release rates from the WR-1 during the closure phase is provided in Table 3-13.

Table 3-12: Summary of Atmospheric Tritium (HTO) Release Rates from WR-1 from 2011 to 2019

Year	Maximum (Bq/week)	Average (Bq/week)
2011	1.14E+09	6.01E+08
2012	5.55E+10[1]	3.66E+09
2013	1.30E+09	6.77E+08
2014	1.26E+09	6.69E+08
2015	1.28E+10	1.90E+09
2016	1.07E+09	6.24E+08
2017	6.33E+09	9.68E+08
2018	5.41E+08	2.51E+08
2019	1.61E+09	6.43E+08
2011 – 2019 Average	-	1.11E+09

Notes:

1. Tritium was elevated in 2012 due to an approved non-routine release of a small volume of spent moderator water sample via the Reactor stack, measured as tritium oxide (AECL 2013).

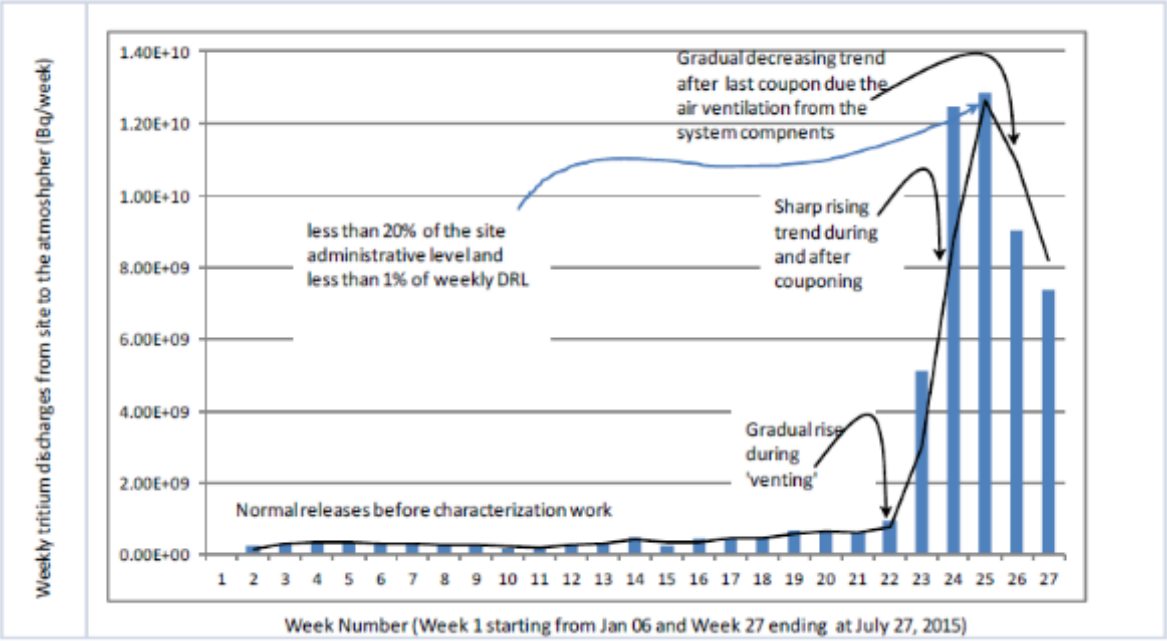


Figure 3-4: Weekly Tritium Release from Stack Before and After Radiological Characterization Activities (CNL 2015b)

Table 3-13: Summary of Predicted Maximum and Average Atmospheric Tritium Release Rates from WR-1

Closure Activity	Maximum (Bq/s)	Average (Bq/s)
Demolition prior to Grouting	6.05E+03	1.84E+03
Grouting	2.12E+04	2.12E+04
Demolition post Grouting	None	None

3.1.2 Non-Radiological Releases

CNL has determined that a select number of non-radiological contaminants of potential concern (COPCs) are expected to be encapsulated as part of ISD, as shown in Table 3-14. Therefore, these non-radiological COPCs may be released during grouting activities from the WL site. To assess a range of quantities, as a conservative estimate, the quantity provided in Table 3-14 was used as an average inventory and the upper end of the uncertainty range was used as a maximum inventory.

As indicated above, it is expected that grouting of below grade structures will occur for 3 to 5 months on a schedule of 5 days per week, however, it has been assumed that grouting will occur for 1 year. Over that period, the total volume of grout used will be 10,000 m^3. Based on a grout density of 2190 kg/m^3, the total mass of grout used during this phase will be 21,900 tonnes. The maximum and average concentration in grout was determined based on the total mass of grout and the quantity of COPCs provided in Table 3-14, based on average inventory and the upper end of the uncertainty range used as the maximum inventory.

The maximum and average particulate release rates during grouting shown in Table 3-2 (Table 6.2.1-11 and Table 6.2.1-12 in the EIS (Golder, EcoMetrix, InterGroup 2022)) were combined with the non-radiological COPC inventory from Table 3-14 to estimate the release rate per COPC that could be expected during grouting activities in the closure phase, as shown in Table 3-15. Assuming COPCs are released as SPM gives the most conservative release rate for non-radiological COPCs.

Table 3-14: Summary of Non-Radiological COPCs in WR-1 System

Non-Radiological COPC	Quantity (kg)	Uncertainty Factor Range
Potassium Hydroxide	0.01	0.1-10
Boron	0.0009	0.1-10
Lead	40,800	1-3
Xylene	1.9	0.1-10
Palladium	15.5	0.1-10
Chromium	148	1-10
Cadmium	91.4	1-10
HB-40 (Hydrogenated Terphenyl)	87,700	0.5-2
Mercury	0.33	1-10

Table 3-15: Estimated Non-Radiological COPC Release Rates from WR-1 Systems during Grouting

Non-Radiological COPC	Concentration in Grout (kg/g)		Release Rate (kg/s)					
			SPM		PM_{10}		$PM_{2.5}$	
	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Potassium Hydroxide	4.57E-12	4.57E-13	**3.66E-14**	**1.94E-15**	1.73E-14	9.18E-16	2.62E-15	1.39E-16
Boron	4.11E-13	4.11E-14	**3.30E-15**	**1.75E-16**	1.56E-15	8.26E-17	2.36E-16	1.25E-17
Lead	5.59E-06	1.86E-06	**4.48E-08**	**7.92E-09**	2.12E-08	3.74E-09	3.21E-09	5.66E-10
Xylene	8.68E-10	8.68E-11	**6.96E-12**	**3.69E-13**	3.29E-12	1.74E-13	4.98E-13	2.64E-14
Palladium	7.08E-09	7.08E-10	**5.68E-11**	**3.01E-12**	2.68E-11	1.42E-12	4.06E-12	2.15E-13
Chromium	6.76E-08	6.76E-09	**5.42E-10**	**2.87E-11**	2.56E-10	1.36E-11	3.88E-11	2.05E-12
Cadmium	4.17E-08	4.17E-09	**3.35E-10**	**1.77E-11**	1.58E-10	8.39E-12	2.40E-11	1.27E-12
HB-40	8.01E-06	4.00E-06	**6.42E-08**	**1.70E-08**	3.04E-08	8.05E-09	4.60E-09	1.22E-09
Mercury	1.51E-10	1.51E-11	**1.21E-12**	**6.40E-14**	5.71E-13	3.03E-14	8.65E-14	4.58E-15

Note:

Red and bolded text indicates values used in the ERA

3.2 Post-Closure Phase

The post-closure phase including the institutional control period, is not likely to have a source of emissions for airborne contaminants. The grouting will be completed and the above-grade building and components will have been removed. An engineered cover will

have been installed on top of the buried material. During the post-closure phase the site will be under institutional control.

The focus in the post-closure phase is on potential releases from the Whiteshell Reactor Disposal Facility (WRDF) to groundwater and subsequent migration of groundwater to surface water at the Winnipeg River. It is anticipated that the grout and the reactor components will gradually deteriorate over time, allowing the release of solutes into the groundwater.

The source-term characterization for the radionuclides and non-radionuclides remaining in the WRDF for 50 years following shutdown is presented in Table 4-2 of Golder 2021b. 50 years following shutdown corresponds to the assumed "release" of mass to porewater in the grout used for the ISD. For decay products that were not originally identified in the CNL mass inventory documentation, the relative amount of mass present at 50 years following shutdown of the reactor was calculated based on the amount of parent radionuclides present at shutdown.

To support the Project, a groundwater model (see Section 6.3.2 of the EIS (Golder, EcoMetrix, InterGroup 2022) and Section 3 of Golder 2021b) was used to predict mass loadings (g/year) of radiological and non-radiological COPCs. Groundwater flow simulations were performed in MODFLOW-2005 and Visual MODFLOW® (Version 4.6.0.156) was used as the numeric flow engine for the simulations. MODPATH was used to complete the particle tracking analyses necessary to illustrate the flow paths from the WRDF. An analytical approach, using GoldSim® (Version 11.1) was used to complete the solute transport modelling. Details on the MODFLOW and GoldSim® models are described in Section 6.3.2 of the EIS (Golder, EcoMetrix, InterGroup 2022) and Golder 2021b. The modelled mass loadings to the Winnipeg River included decay products of the initial inventory.

Based on the groundwater model, mass loadings (g/year) of radionuclides and non-radionuclides to the Winnipeg River were provided over a modelling timeframe of 500,000 years.

The loadings may result in a chemical change to the Winnipeg River, but there will be no structural change to the river (i.e., habitat alteration) as a result of this Project.

3.2.1 Radiological Release

Maximum mass loadings for each radionuclide expected to be potentially released from the WRDF over the 500,000 year modelling timeframe are presented in Table 3-16. A number of radionuclides (Nb-94, Ra-224, Ra-228, Sm-148, Th-228, and Th-232) did not achieve maximum loadings before 500,000 years. The groundwater flow and solute transport model was run again without the 500,000 years constraint to determine the peak mass loadings and these are reflected in Table 3-16.

A number of radionuclides have minimal mass loadings over the modelling timeframe. This could be attributed to limited initial mass, extensive decay of the isotope occurring before reaching the outflow (i.e., short half-life relative to the release and pathway travel times), or delayed arrival of the radionuclide.

Mass loadings from the groundwater model of radon-222 (Rn-222) are provided but aquatic dispersion was excluded as radon is expected to volatilize rapidly to air. This assumption is consistent with Clause 5.1.8 of CSA N288.1-14 which indicates that noble gases, including Rn-222, are not considered relevant for release to water since they do not enter environmental compartments other than air. Doses from noble gases released with liquid effluent are expected to be negligible. The ERA model follows this approach.

Samarium-148 (Sm-148) also had mass loadings provided from the groundwater model but was determined to have no radiological concern due to its very long half-life and no toxicological concern based on its low groundwater concentration (6.99E-23 µg/L versus an aquatic life benchmark of 0.74 µg/L (Borgmann *et al.* 2005)). Therefore Sm-148 was also excluded from aquatic dispersion modelling.

Mass loadings to the Winnipeg River over the 500,000 year period, from the groundwater model, were converted to activity loadings based on the equation below:

$$A_{Bq} = \frac{m}{m_a} N_A \frac{ln(2)}{t_{1/2}}$$

where,

m = mass of radionuclide (g)
m_a = atomic mass (g/mol)
N_A = Avogadro's number (6.022×10^{23}/mol)
$t_{1/2}$ = half-life of the radionuclide (s)

Table 3-16: Maximum Mass and Activity Loadings to the Winnipeg River for Radionuclides in Groundwater

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Ac-225	1.70E-17	87,200	225.02	8.64E+05	1.16E-09
Ac-227	1.41E-14	157,200	227.03	6.87E+08	1.20E-09
Ag-108m	7.96E-13	3,661	107.91	1.38E+10	7.07E-09
Am-241	0.00E+00	0	241.06	1.36E+10	0.00E+00
Am-243	0.00E+00	0	243.06	2.32E+11	0.00E+00
Bi-210	2.29E-14	204,000	209.98	4.33E+05	3.33E-06
C-14	5.55E-04	1,006	14.00	1.81E+11	2.90E+00
Ca-41	1.55E-06	19,500	40.96	3.22E+12	1.56E-04
Cl-36	1.15E-08	162	35.97	9.46E+12	4.47E-07

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Cm-244	0.00E+00	0	244.06	5.71E+08	0.00E+00
Co-60	0.00E+00	0	59.93	1.67E+08	0.00E+00
Cs-137	0.00E+00	0	137.91	9.51E+08	0.00E+00
Eu-152	0.00E+00	0	151.92	4.26E+08	0.00E+00
Eu-154	0.00E+00	0	153.92	2.71E+08	0.00E+00
Eu-155	0.00E+00	0	154.92	1.50E+08	0.00E+00
Fe-55	0.00E+00	0	54.94	8.51E+07	0.00E+00
Gd-152	1.71E-07	204	151.92	3.41E+21	4.37E-15
H-3	6.37E-05	67	3.02	3.89E+08	7.20E+02
I-129	1.44E-04	170	128.90	4.95E+14	2.99E-05
Nb-94	6.43E-21	646,000*	93.91	6.40E+11	1.42E-18
Nd-144	0.00E+00	0	143.91	7.22E+22	0.00E+00
Ni-59	5.48E-05	486,000	58.93	3.19E+12	3.86E-03
Ni-63	0.00E+00	0	62.93	3.15E+09	0.00E+00
Np-237	5.15E-06	40,700	237.05	6.75E+13	4.26E-06
Np-239	0.00E+00	0	239.05	2.04E+05	0.00E+00
Pa-231	2.16E-11	159,200	231.04	1.03E+12	1.20E-09
Pa-233	2.33E-16	40,400	233.04	2.33E+06	5.68E-09
Pb-210	9.29E-13	206,200	209.98	7.03E+08	8.33E-08
Po-210	1.64E-10	199,800	209.98	1.19E+07	8.68E-04
Pu-238	0.00E+00	0	238.05	2.77E+09	0.00E+00
Pu-239	2.39E-07	106,400	239.05	7.60E+11	1.74E-05
Pu-240	1.58E-10	66,200	240.05	2.07E+11	4.21E-08
Pu-241	0.00E+00	0	241.06	4.42E+08	0.00E+00
Ra-223	3.36E-16	157,700	223.02	9.88E+05	2.02E-08
Ra-224	6.67E-22	1,903,000*	224.02	3.14E+05	1.26E-13
Ra-225	2.17E-16	87,300	225.02	1.29E+06	9.92E-09
Ra-226	1.65E-11	203,700	226.03	5.05E+10	1.91E-08
Ra-228	3.90E-19	936,000*	228.03	1.80E+08	1.26E-13
Rn-222	4.82E-12	205,700	222.02	3.30E+05	8.70E-04
Sm-148	4.85E-24	20,000,000*	147.91	2.21E+23	1.97E-33
Sr-90	0.00E+00	0	89.91	9.08E+08	0.00E+00
Tc-99	1.60E-05	10,600	98.91	6.65E+12	3.22E-04
Th-227	6.12E-17	160,000	227.03	1.61E+06	2.21E-09
Th-228	2.84E-20	1,090,000*	228.03	6.03E+07	2.73E-14
Th-229	8.69E-12	89,300	229.03	2.30E+11	2.18E-09
Th-230	1.73E-10	200,400	230.03	2.38E+12	4.19E-09
Th-231	4.63E-18	117,000	231.04	9.19E+04	2.89E-09

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Th-232	2.12E-10	632,000*	232.04	4.45E+17	2.72E-14
Th-234	7.35E-16	115,400	234.04	2.08E+06	2.00E-08
U-233	2.79E-08	74,500	233.04	5.02E+12	3.16E-07
U-234	1.36E-07	126,500	234.04	7.74E+12	9.93E-07
U-235	1.60E-04	118,000	235.04	2.22E+16	4.05E-07
U-236	7.21E-06	117,900	236.05	7.40E+14	5.46E-07
U-237	0.00E+00	0	237.05	5.83E+05	0.00E+00
U-238	7.10E-03	116,600	238.05	1.41E+17	2.80E-06
Y-90	0.00E+00	0	89.91	2.31E+05	0.00E+00

Note:
* The model was run for 500,000 years. For these radionuclide contaminants, the maximum loading was not reached before 500,000 years; therefore, the model runtime was extended until the maximum was reached (see Section 5.4.3).

3.2.2 Non-Radiological Release

Maximum mass loadings for each non-radionuclide expected to be potentially released from the WRDF over the 500,000 year modelling timeframe are presented in Table 3-17. A number of non-radionuclides (barium, chromium, copper, mercury, nickel, lead, samarium, ruthenium, and zirconium) did not achieve maximum loadings before 500,000 years. The groundwater flow and solute transport model was run again without the 500,000 years constraint to determine the peak mass loadings and is reflected in Table 3-17.

Table 3-17: Maximum Mass Loadings to the Winnipeg River for Non-Radionuclides in Groundwater

Non-Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)
Argon	6.88E-12	224
Boron	1.87E-04	4,235
Barium	1.82E-08	10,740,000 *
Bismuth	1.12E-08	78,800
Cadmium	3.71E-01	203,000
Cobalt	2.12E-02	93,800
Chromium	2.42E-03	19,998,000 *
Copper	5.47E-04	876,000 *
Gadolinium	6.48E-06	213
HB-40	4.05E+01	10,200
Helium	1.07E-02	145
Mercury	4.16E-05	6,546,000 *
Potassium	3.27E-07	13,000
Potassium hydroxide	4.76E-02	142
Manganese	8.33E-05	354,500
Molybdenum	1.17E-02	17,900
Nitrogen	5.44E-04	17,900
Nickel	4.81E-05	840,000 *
Lead	5.05E+00	5,596,000 *
Palladium	1.05E-01	121,000
Ruthenium	6.15E-09	374,100
Sulphur	2.37E-12	193
Samarium	3.65E-12	20,000,000 *
Xenon	1.39E-09	195
Xylene	4.32E+00	202
Zirconium	1.51E-10	20,000,000 *

Note:
* The model was run for 500,000 years. For these non-radionuclide contaminants, the maximum loading was not reached before 500,000 years; therefore, the model runtime was extended until the maximum was reached (see Section 5.4.3).

4.0 HUMAN HEALTH RISK ASSESSMENT - CLOSURE

4.1 Problem Formulation

4.1.1 Receptor Selection and Characterization

The receptors for the HHRA were selected to be appropriate for assessment of both radiological and non-radiological stressors on human health. Off-site members of the public are potentially exposed to low levels of airborne or waterborne contaminants. The most-affected off-site members of the public are defined as the "critical group". A number of candidate critical groups are assessed, as described below.

According to CSA N288.6-12, Nuclear Energy Workers who participate in a Radiation Protection Program do not require radiological assessment in the ERA because their radiation exposure is monitored and their doses are controlled. Workers on the WL site will participate in CNL's Radiation Protection Program. However, on-site WL workers have been assessed in this ERA for radiological exposures; no non-radiological COPCs were identified (Section 4.1.2).

Human receptors evaluated for both the radiological and non-radiological assessment for the normal evolution closure scenario include off-site members of the public and those critical groups used for dose calculations in the *Derived Release Limits* (DRL) *for CNL's Whiteshell Laboratories* (CNL 2016b). These receptors are potentially exposed to airborne effluent from Building 100 for the closure scenario. These critical groups include:

- Farm A and F (year-round occupants, with livestock);
- Harvesters (additional receptor not identified in the DRLs).

Farms A and F are the most exposed critical groups for atmospheric releases based on the DRL report, and are shown on Figure 4-1.

Harvesters represent Indigenous or Traditional users of the area who may be exposed through harvesting of country foods (see Table 4-6 for exposure factors for the harvester). It is assumed that the harvesters spend part of their time on-site, part near Farm F, and part at an unexposed location. CNL (2018a) conducted an Indigenous Food Intake Survey completed by members of the Sagkeeng First Nation and Manitoba Métis Citizens to understand the types and quantities of local food consumed. The survey results have been incorporated into the Harvester's diet and are discussed in more detail in Sections 4.1.3 and 4.2.4.

Farms A and F are both livestock farms with the same characteristics as each other except for the location (see Table 4-5 for exposure factors for the farm). Members of Farms A and F are considered to:

- Reside at the farm 100% of the time;

- Obtain the majority of their fruit and vegetables from their on-site garden;
- Obtain drinking water from an on-site well;
- Supply all of their own milk, poultry and eggs from their farm;
- Supply some of their beef and pork from their farm;
- Acquire honey from their farm;
- Obtain game (deer) meat requirement from hunting on their own property; and
- Use a backyard swimming pool filled with well water 3 months out of the year.

Consistent with the DRL report, recreational users such as swimmers, anglers, and boaters that occasionally carry out recreational activities along the Winnipeg River are not considered for the closure scenario because these activities are not representative of population groups in the area.

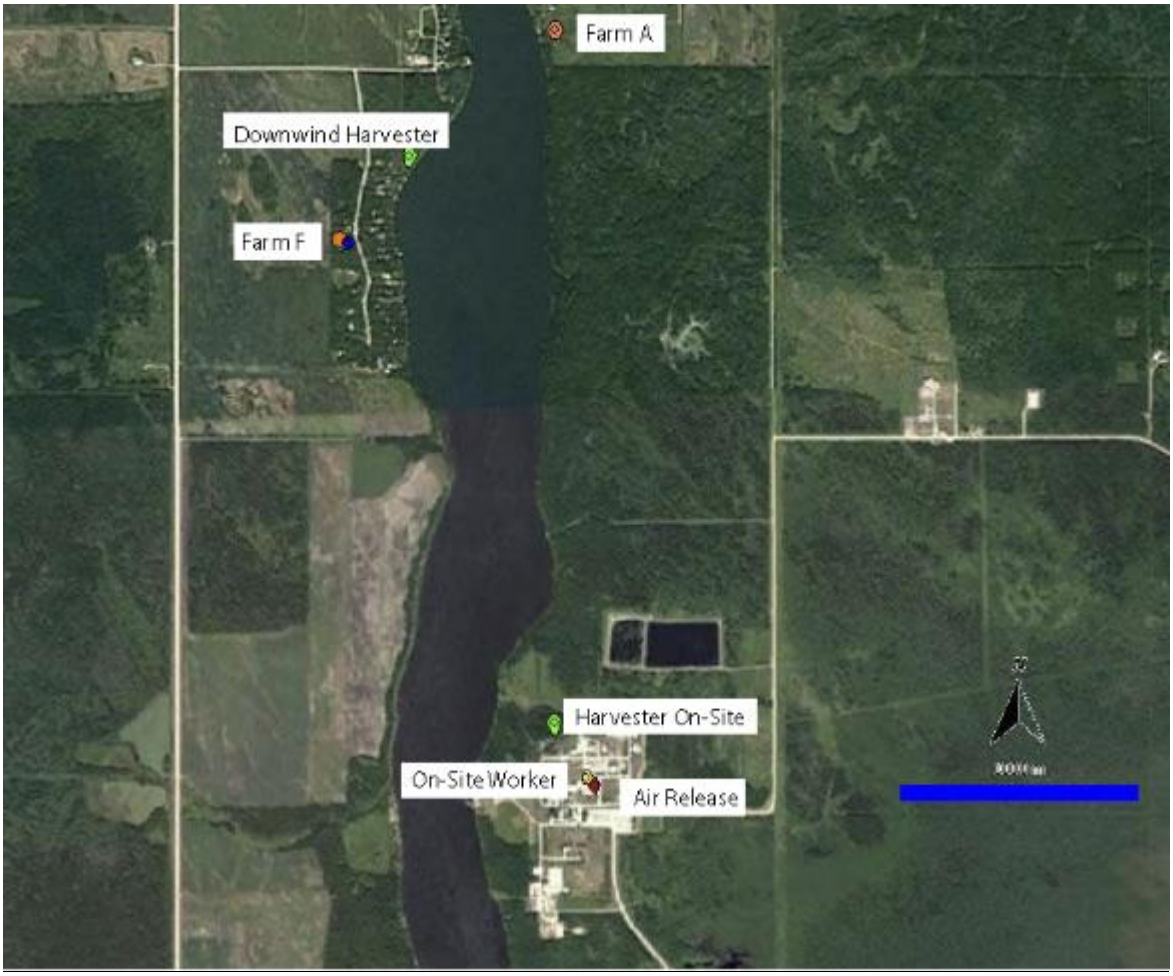


Figure 4-1: Human Receptor Locations for the Closure Phase

4.1.2 Selection of Chemical, Radiological, and Other Stressors

Radiological and non-radiological contaminants associated with WR-1 have been identified in the DSAR (Golder 2021a), the EIS (Golder, EcoMetrix, InterGroup 2022), and Section 3.0 of this ERA. For the closure phase, the contaminants will be released via atmospheric releases from the WR-1 Complex. It has been assumed that the WR-1 Complex stack is removed during the closure phase; therefore, atmospheric releases are assumed to occur at ground level. No Project releases to surface water are anticipated during the closure phase.

During preparation for ISD activities in the closure phase, a temporary batch mixing plant will be utilized for preparation of grout on-site. The atmospheric environment (Section 6.2 of the EIS) identified fugitive dust emissions as the primary release from the batch plant and recommended the use of an enclosure for the batch mixing plant and raw material handling to minimize emissions. Predicted air concentrations for particulate matter, nitrogen oxides, sulphur dioxide, and carbon monoxide were below relevant air quality criteria; therefore, no human health effects are anticipated. This is discussed further in EIS Section 6.2.1.

No additional releases associated with the WR-1 source (radiological or non-radiological) are expected from the batch plant; therefore, the batch plant is not considered further in the ERA.

4.1.2.1 Selection of Radiological COPCs

Radionuclides are considered of public and regulatory interest and therefore all radionuclides identified through the source-term characterization process (see Section 3.1.1) were carried forward quantitatively in the HHRA and did not undergo a formal screening assessment.

As discussed in Section 3.1.1, radionuclides will be released to the atmosphere during the closure phase – during grouting and demolition activities. Additionally, some above-grade systems and structures have existing contamination, such as the PHT system. The PHT will be disassembled and above grade portions relocated below grade prior to grouting (CNL 2021b). During grouting, radionuclides remaining may be released from the reactor core and biological shield.

It is expected that there will be negligible release of radionuclides to the atmosphere during WR-1 Complex decommissioning activities after grouting since CNL intends to characterize, survey, and decontaminate or immobilize any residual contamination prior to demolition. Therefore, no release and subsequent exposure modelling has been performed for the demolition post grouting phase.

As discussed in Section 3.1.1.3, it is expected that tritium will be released from the helium and heavy water system during demolition activities prior to grouting and grouting activities.

4.1.2.2 Selection of Non-Radiological COPCs

As discussed in Section 3.1.2, CNL has determined that a select number of non-radiological COPCs are expected to be encapsulated as part of ISD. These non-radiological COPCs may be released during grouting activities from the WL site, according to the release rates estimated in Table 3-15. Assuming COPCs are released as SPM gives the most conservative release rate for non-radiological COPCs.

An on-site receptor that could be exposed to atmospheric COPCs was selected for the closure phase. The location of the receptor was selected to maximize exposure by locating the receptor in the prevailing wind direction based on existing meteorological data. IMPACT™ was used to determine the annual dispersion factor from source to on-site receptor. To estimate the concentration for each non-radiological COPC at the location of an on-site receptor, the daily release rate (SPM) per COPC was multiplied by the daily dispersion factor of 3.18E-05 s/m^3 determined from the IMPACT™ model. The annual dispersion factor from IMPACT™ was converted to a daily value using the MOECC (2017) averaging equation to convert between averaging periods. Air concentrations were then compared against their respective air criteria in the same averaging period (i.e., 24-hour).

Applicable air quality criteria were selected for each non-radiological COPC with a preference for ambient air quality criteria from Manitoba. Where local criteria were not available, criteria from other jurisdictions such as Ontario were used. The majority of the non-radiological COPCs have air quality criteria in the 24 hour averaging period; however, where needed, predicted concentrations were converted to match the averaging period of the relevant criterion. As shown in Table 4-1, all predicted air concentrations for all non-radiological COPCs evaluated are below their relevant ambient air quality criteria; therefore, no health effects are anticipated during the closure phase due to inhalation.

Although air quality criteria have been identified for boron and potassium hydroxide, these are not considered health-based criteria. Potassium hydroxide is considered a corrosive chemical, however chronic inhalation at low concentrations is not a human health concern. Additionally, studies from the US EPA (2008) have concluded that boron inhalation has not been associated with adverse health effects in humans.

Table 4-1: Screening of Non-Radiological COPCs against Relevant Air Quality Criteria

Non-Radiological COPC	Max Air Conc. (µg/m^3)	Average Air Conc. (µg/m^3)	Averaging Period	Applicable Air Quality Guideline (µg/m^3)	Reference	COPC?
Potassium Hydroxide	1.16E-09	6.17E-11	24-hour	14	Ontario AAQC (corrosion) [2]	No
Boron	1.05E-10	5.56E-12	24-hour	120	Ontario AAQC (particulate) [2]	No
Lead	1.43E-03	2.52E-04	24-hour	2	Manitoba AAQC (MAC) [1]	No

Non-Radiological COPC	Max Air Conc. (µg/m³)	Average Air Conc. (µg/m³)	Averaging Period	Applicable Air Quality Guideline (µg/m³)	Reference	COPC?
Xylene	2.21E-07	1.17E-08	24-hour	730	Ontario AAQC (health) [2]	No
Palladium	1.81E-06	9.57E-08	24-hour	10	Ontario AAQC (health) [2]	No
Chromium	1.72E-05	9.14E-07	24-hour	0.5	Ontario AAQC (health) [2]	No
Cadmium	1.06E-05	5.64E-07	24-hour	2	Manitoba AAQC (MAC) [1]	No
HB-40	2.78E-03	7.36E-04	8-hour	500	OSHA[3] TWA / 10	No
Mercury	3.84E-08	2.04E-09	24-hour	2	Ontario AAQC (health) [2]	No

Notes:
1. Manitoba Conservation 2005, https://www.gov.mb.ca/sd/envprograms/airquality/pdf/criteria_table_update_july_2005.pdf
2. MOECC 2012, http://www.airqualityontario.com/downloads/AmbientAirQualityCriteria.pdf
3. OSHA (1989) TWA of 5 mg/m³ for hydrogenated terphenyl cited in MSDS for HB-40 (Eastman Chemical Company 2015)

Other non-radiological COPCs have been identified as potentially remaining in the WR-1 system, such as asbestos and mould. Mould and asbestos are hazards that are routinely addressed at CNL within approved procedures that outline the process for safely performing work on or near these materials (CNL 2017b, 2019c). Following these procedures ensures these materials are managed within the required regulations and limits and in accordance with standard practice.

A construction Health and Safety Plan (HASP) will identify workplace hazards associated with the closure phase activities, specifically addressing all non-radiological COPCs. It will define workplace procedures to limit worker exposures, allowable airborne exposure concentrations, compliance monitoring programs, and waste disposal plans, in accordance with applicable workplace safety regulations. The regulations require collection and proper disposal of waste materials containing designated substances (asbestos, lead, PCBs, and mercury). Accordingly, there will be very little release of these materials to the environment. The HASP will ensure that workplace concentrations of hazardous substances during the closure phase are safe for workers.

With the exception of HB-40, the identified hazardous substances are routinely addressed in construction projects. HB-40 consists mainly of hydrogenated terphenyl (74-87%), with smaller fractions of partially hydrogenated terphenyls and terphenyl. OSHA's permissible exposure level (PEL) for hydrogenated terphenyl is 5 mg/m³ as a time-weighted average (TWA). The PEL for terphenyl is 9 mg/m³ as a ceiling value. Weeks (1974) calculated a permissible exposure level for HB-40 of 4.4 mg/m³, for a 40 hour work week, based on a minimal effect concentration of 500 mg/m³ in mice, with a 100-fold safety factor. Similarly, Farr et al. (1989), using rats, found an effect concentration for hydrogenated terphenyl of

500 mg/m^3, and a no-effect concentration of 100 mg/m^3. These studies support the OSHA PELs and their use for HB-40.

4.1.3 Selection of Exposure Pathways

Pathways relevant to exposure to liquid effluent are considered incomplete during the closure phase. During the closure phase, releases to surface water are not expected, because any release from the grouted reactor would occur after closure, and contaminant transport via groundwater to surface water would take additional time.

Pathways relevant to exposure to atmospheric releases are presented for the human receptors in Table 4-2. During the closure phase, human receptors on Farm A and F will be exposed via air (inhalation, immersion), soil (incidental ingestion, ground shine), well water (ingestion, bathing), and ingestion of home-grown vegetables, fruits, and livestock, and ingestion from locally hunted deer. In CSA N288.1-14 (2014), atmospheric releases can end up in groundwater (via infiltration through the soil) or in a small farm pond via atmospheric deposition.

Atmospheric deposition to the Winnipeg River is considered negligible. This is consistent with the COG DRL guidance (COG, 2013) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of radionuclides from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible. Rivers have larger flow rates than lakes; therefore, the conclusion for lakes that the atmospheric deposition pathway is negligible is applicable to rivers as well.

In CSA N288.1-14 (2014) the release of radionuclides from surface soil to the atmosphere is considered negligible because transfer is predominately from the atmosphere to soil. This pathway was not included during closure for this reason.

It was noted from engagement with Indigenous communities that Sagkeeng First Nation members in the Whiteshell area harvest wild rice and medicinal plants. However, wild rice does not grow in close proximity to WR-1.

CNL (2018a) also conducted an Indigenous Food Intake Survey completed by members of the Sagkeeng First Nation to understand the types and quantities of local food consumed. CNL also partnered with the Manitoba Métis Federation (MMF) to conduct Harvester food intake surveys with Manitoba Métis Citizens that harvest in the area of the WL site (Shared Value Solutions 2018). The information provided confirmed the VCs selected for the EIS and was used to validate the assumptions made for wild game, fish and plant ingestion rates for subsistent receptors. The intake rates from the MMF survey were lower than the intake rates identified by the Sagkeeng First Nation. Therefore, the Harvester receptor in the model uses the intake rates from the Sagkeeng First Nation Indigenous food intake survey. The survey results have been incorporated into the Harvester's diet.

The results indicate that survey participants consume animals such as wild game (e.g., moose, deer, rabbit and hare), waterfowl (e.g., duck and geese), fish, fruits and berries, and

medicinal plants (e.g., weekay and cedar). Although a number of respondents indicated that they eat moose, moose are not commonly found around Pinawa and Lac du Bonnet, but are typically farther north. Additionally, during the closure phase, the focus is on terrestrial pathways, since only atmospheric releases are expected. Based on these considerations terrestrial animals including hare and deer, terrestrial plants including berries, and medicinal plants including cedar and weekay are included in the assessment for the harvester for the closure phase. Other intakes for the harvester (such as moose) are considered in the post-closure phase where aquatic pathways are more applicable.

Exposure pathways for on-site workers include inhalation of air on-site as well as immersion, and soil external contact and incidental ingestion pathways for outdoor workers. Non-radiological pathways are not applicable as no non-radionuclides were identified as COPCs for the closure phase.

Table 4-2: Complete Exposure Pathways for Receptors for Exposure to Radiological COPCs during Closure

Receptor	Exposure Pathway	Environmental Media
Farm (A or F)	Inhalation	Air
	Ingestion	Water (well water) Soil (incidental) Terrestrial plants (homegrown) Terrestrial animals (beef, pork, poultry, eggs, milk, game, honey)
	External	Air Water (well water) Soil
Harvester	Inhalation	Air
	Ingestion	Terrestrial animals (hare, deer) Terrestrial plants (berries, weekay, cedar)
	External	Air Soil
On-Site WL Worker	Inhalation	Air
	Ingestion	Soil (incidental)
	External	Air Soil

Note:
Soil is considered to be clay as defined in the Hydrogeology Study Report (Dillon 2018).

4.1.4 Human Health Conceptual Model

The conceptual model illustrates how receptors are exposed to COPCs. It represents the relationship between the source and receptors by identifying the source of contaminants, receptor locations and the exposure pathways to be considered in the assessment for each receptor. Exposure pathways represent the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or (for radionuclides) how they may exert effects from outside the body.

The conceptual model for atmospheric releases from the DRL Report (CNL 2016b) is appropriate for identified farm receptors during the closure phase and is modified slightly to represent the harvester (see Figure 4-2 and Figure 4-3). These figures are consistent with the complete exposure pathways identified in Table 4-2. These figures represent the exposure pathways from source to receptor. It is appropriate for radiological and non-radiological COPCs, except that, for non-radionuclides, external and immersion pathways are replaced by dermal exposure pathways.

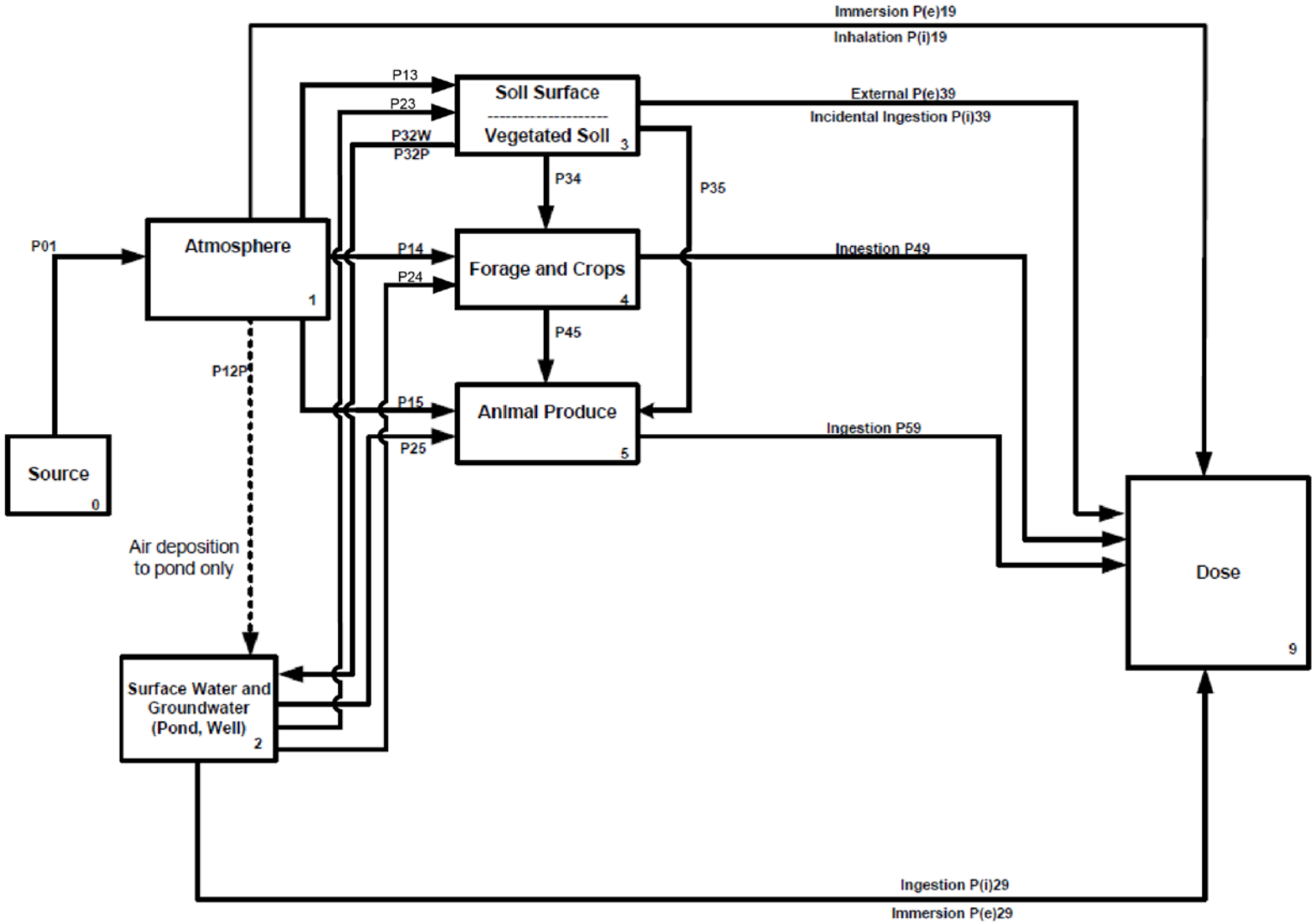


Figure 4-2: Conceptual Model for Human Receptors during the Closure Phase (Farm A/F)

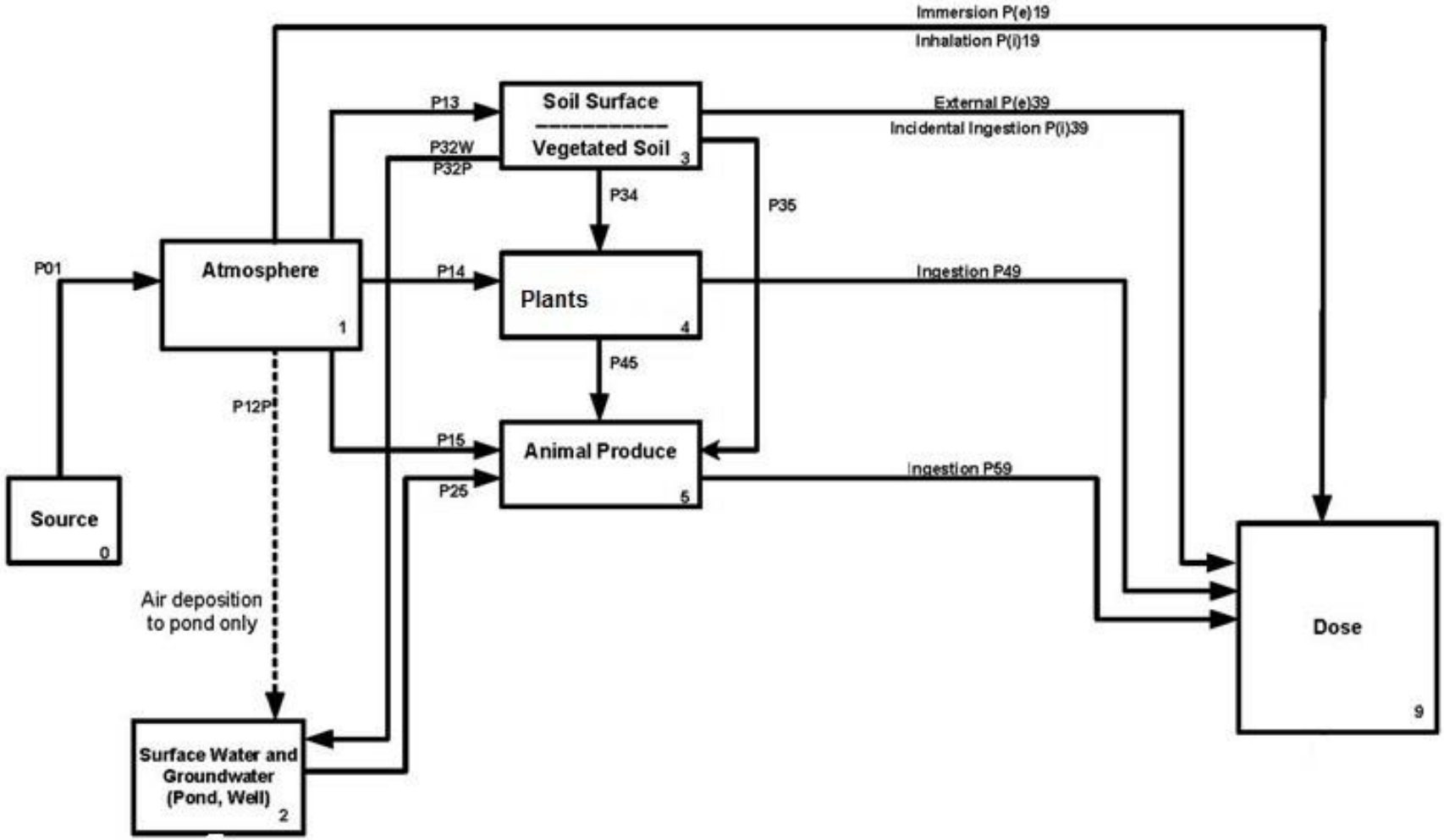


Figure 4-3: Conceptual Model for Human Receptors during the Closure Phase (Harvester)

4.1.5 Uncertainty in Problem Formulation

The HHRA problem formulation is conservative in its assumptions to accommodate uncertainties and meet the objective of protecting human health during the closure phase.

Maximum predicted concentrations were selected for COPC screening in air; this is considered conservative and is not reflective of typical human exposures. The conceptual model for human health is considered to be complete for the majority of general public exposures in the vicinity of the WL site. The selected receptors are expected to lead to conservative estimates of health risks. The selected exposure pathways are consistent with available guidance (for example, N288.1-14), and are expected to account for all significant exposure pathways for human receptors in the area.

There are uncertainties in the predicted radiological and non-radiological release rates to the atmosphere; however, the estimates are expected to be appropriate as they are based on best available information on existing inventory of radiological and non-radiological contaminants in WR-1, as discussed in Section 3.1. Conservative assumptions were made about duration of release. For example, although the duration of demolition prior to grouting may be carried out in 1 to 2 months, it has been assumed that it will occur for 6 months (see Section 3.1.1.1). Additionally, while grouting may occur for 3 to 5 months, it has been assumed that it will occur for 1 year.

4.2 Exposure Assessment

4.2.1 Exposure Locations

The exposure location is the location where the receptor comes into contact with the COPC or stressor. For both the radiological and non-radiological exposure assessment the relevant human receptors are Farms A and F, and a local harvester, as discussed in Section 4.1.1. An on-site WL worker is also assessed. Table 4-3 and Figure 4-1 present the locations of these receptors. The easting and northing for each receptor is presented.

Table 4-3: Location of Human Receptors for Closure Phase

Potential Critical Group	Easting (m)	Northing (m)
Farm A	709547	5565803
Farm F	708772	5564710
Harvester (On-Site)	709674	5562686
Harvester (Off-Site)	709060	5565067
On-Site WL Worker	709812	5562448

4.2.2 Exposure Duration and Frequency

Full-time residency was assumed for the residents of Farm A and Farm F. The harvester was assumed to harvest on the WL site for 2 hours per week, upwind in the vicinity of Farm A for 2 hours per week, and downwind for 2 hours per week. For Farm A, the percentage of food items in the diet that are obtained from local sources was consistent with the DRL report (CNL 2016b), with some modifications. Although honey is currently produced at another local farm; it was assumed that during the closure phase Farms A and F obtain their honey from their own farms; therefore, the percentage of honey obtained from local sources was considered to be 100%.

For the harvester, the local percentage of food intake was assumed to be 33% (for deer, rabbit, and berries/plants) based on the assumption that the harvester only spends 33% of harvesting time on-site (see Table 4-4).

During closure, the harvester was not assumed to eat local fish or duck, since the relevant exposure pathways are the terrestrial pathways and not the aquatic pathways. As indicated in Section 4.1.3, and consistent with the COG DRL guidance (COG, 2013), atmospheric deposition to a large water body is considered negligible. Large bodies of water would include lakes and rivers (e.g., the Winnipeg River).

All water for drinking, irrigation, bathing, and animal drinking is obtained from a local well with the exception of the deer that drinks from pond water.

The on-site WL worker was assumed to spend 40 hours/week and 50 weeks/year on the WL site. The worker is assumed to have no local intake since on-site drinking water would likely be obtained from a treated water source. In the closure phase, contaminants are released to the atmosphere; therefore, there will be minimal impact on the Winnipeg River. In CSA N288.1-14 (2014), atmospheric releases can end up in groundwater (via infiltration through the soil) or in a small farm pond via atmospheric deposition. Deposition into a river or lake is considered negligible.

Table 4-4: Percentage of Food from Local Sources During the Closure Phase

Receptor	Terrestrial Animal Products[3]									Plant Products[3]					Fish[2]
	Beef[4]	Pork	Poultry	Venison	Rabbit	Duck	Eggs	Milk	Honey	Medicinal Plants[5]	Fruit	Above-Ground Vegetables	Potatoes	Grain	
Farm F	50	50	100	100	0	0	100	100	100	0	15	25	100	0	0
Harvester[1]	0	0	0	33	33	0	0	0	0	33	33	0	0	0	0

Note:
1. Harvester spends 33% of the time on-site, 33% of the time harvesting near Farm F, and 33% of the time in an unexposed location.
2. No fish ingestion during the closure phase for the farm and harvester, since there are no complete aquatic exposure pathways.
3. The zero percentages indicate foods that are not obtained locally for the receptor, i.e., the pathway is incomplete.
4. Includes beef and beef offal.
5. The harvester consumes cedar and weekay as medicinal plants.

4.2.3 Exposure and Dose Calculations

This section outlines the equations used to calculate doses to human receptors based on modelled COPC concentrations in relevant media. Section 3.2.4 outlines the exposure factors used as parameters in those equations, for various receptors, and describes the approach modelling concentrations in relevant media. Section 3.2.5 briefly describes the modelling approach by which COPC concentrations in various media are calculated.

4.2.3.1 Radiological Dose Calculations

Equations to derive radiological dose via inhalation, air immersion, ground shine, soil/sediment ingestion, water immersion, water ingestion, and food ingestion are from CSA N288.1-14 (2014) and are presented below.

Dose via particulate inhalation was calculated using the following equation:

$$Dose_{inh}\,(\frac{Sv}{annum}) = I \times DC_{inh} \times OF_i \times C_a$$

I = inhalation rate (m^3/a)
DC_{inh} = dose coefficient for inhalation (Sv/Bq)
OF_i = occupancy factor (unitless)
C_a = concentration in air (Bq/m^3)

Dose from immersion in contaminated air was calculated using the following equation:

$$Dose_{imm}\,(\frac{Sv}{annum}) = f_0 \times [f_u + (1 - f_u) \times S_b] \times\ DC_a \times C_a$$

f_0 = fraction of time spent at exposure location (unitless)
f_u = time spent outdoors as fraction of time spent at site (unitless)
S_b = building shielding factor (unitless)
DC_a = effective dose coefficient for a semi-infinite cloud (Sv-m^3/Bq-a)
C_a = concentration in air (Bq/m^3)

Dose from groundshine was calculated using the following equation:

$$Dose_{groundshine}\,(\frac{Sv}{annum}) = f_0 \times f_r \times [f_u + (1 - f_u) \times S_g] \times\ DC_g \times C_g$$

f_0 = fraction of time spent at exposure location (unitless)
f_r = dose reduction factor for non-uniformity of ground surface (unitless)
f_u = time spent outdoors as fraction of time spent on-site (unitless)
f_i = time spent indoors as fraction of time spent on-site (unitless)
S_g = shielding factor for groundshine (unitless)
DC_g = effective dose coefficient for ground deposit (Sv-m^2/Bq-a)
C_g = activity in ground surface (Bq/m^2)

Dose via soil/sediment ingestion was calculated using the following equation:

$$Dose_{soil}\left(\frac{Sv}{annum}\right) = I_s \times EF_S \times DC_f \times C_s \times (D_f)_s$$

I_s = incidental soil/sediment intake rate (kg dw/day)
EF_s = days per year when soil/sediment ingestion could occur (days)
DC_f = dose coefficient for ingestion (Sv/Bq)
C_s = concentration in soil/sediment (Bq/kg dw)
$(D_f)_s$ = dilution factor for shoreline deposits that allows for non-equilibrium between suspended sediment and shoreline deposits (unitless). For soil ingestion this term is not used.

Dose via immersion in water (obtained from a groundwater well) was calculated using the following equation:

$$Dose_{immersion}\left(\frac{Sv}{annum}\right) = C_{gw} \times DC_{wi} \times (D_c \times \rho \times OF'_w + \rho \times OF''_w)$$

C_{gw} = concentration in groundwater (Bq/L)
DC_{wi} = dose coefficient for immersion in an infinite uniformly contaminated water medium (Sv-L/Bq-a)
D_C = correction factor to account for the finite size of a bathtub (unitless)
ρ = removal factor for to account for processes such as sedimentation and removal of radionuclides by water treatment plants (unitless)
OF_w' = fraction of year spent bathing (unitless)
OF_w'' = fraction of year spent in a swimming pool (unitless)

Dose via water ingestion was calculated using the following equation:

$$Dose_{ingestion}\left(\frac{Sv}{annum}\right) = \rho_w \times k_w'' \times I_w \times DC_f \times C_w$$

ρ_w = removal factor for water treatment (unitless)
k''_w = fraction of drinking water intake that is contaminated (unitless)
I_w = drinking water intake rate (L/a)
DC_f = dose coefficient for intake by ingestion (Sv/Bq)
C_w = concentration in groundwater (Bq/L)

Dose from ingestion of diet components was calculated using the following equation:

$$Dose_{diet}\left(\frac{Sv}{annum}\right) = \rho_f \times g_f \times I_f \times DC_f \times C_s$$

ρ_f = adjustment factor for food processing (unitless)
g_f = fraction of food from contaminated source (unitless)
I_f = intake of food (kg_{fw}/annum)

DC_f = dose coefficient for intake by ingestion (Sv/Bq)
C_f = concentration in food (Bq/kg fw)

4.2.4 Exposure Factors

For the radiological dose calculations the exposure factors (e.g., intake rates, occupancy and shielding factors, etc.) are generally those used in N288.1-14 (CSA 2014).

The intake rates for ingestion and inhalation are the mean intake rates provided in Table G.9b in N288.1-14 (CSA 2014). Consistent with N288.1-14 (CSA 2014), three age classes were evaluated: infant (1 year old), child (10 year old), and adult. The 1 year old infant was evaluated to represent an infant that drinks cows' milk and an infant that drinks formula. The ingestion rate of cows' milk is 665 g fw/d. The ingestion rate for water consumed in formula is the drinking water intake rate (98.9 L/a) since that rate for infants includes water in formula.

A 3 month old was included as well, to represent a nursing and formula-fed infant. The mean intake rates for the 3 month old were obtained from the COG DRL Guidance Document (COG 2013). The 3 month old is assumed to be exclusively fed through breast milk or formula, and does not eat other food. The ingestion rate for breast milk is 985 g fw/d. The ingestion rate for water consumed in formula is the drinking water intake rate (132 L/a) since that rate for infants includes water used to make formula.

Relevant intake rates and other exposure factors used in the human dose calculations for the Farm residents are provided in Table 4-5 along with the appropriate reference. Internal organs such as the liver are included in the "Beef Offal" food type.

The harvester has different aquatic and terrestrial animal ingestion rates based on a different type of diet, as outlined in the Indigenous Food Intake Survey (CNL 2018a). The survey indicates that cedar branches are used to make tea, and for smudging ceremonies, and Weekay (American Sweet Flag) is used for pain relief, smudging and to make tea. The specific ingestion rates for the harvester are provided in Table 4-6 and are based on average values from the Indigenous Food Intake Survey (CNL 2018a).

CNL also partnered with the Manitoba Métis Federation (MMF) to conduct Harvester food intake surveys with Manitoba Métis Citizens that harvest in the area of the WL site (Shared Value Solutions 2018). The information provided confirmed the VCs selected for the EIS and was used to validate the assumptions made for wild game, fish and plant ingestion rates for subsistent receptors. The intake rates from the MMF survey were lower than the intake rates identified by the Sagkeeng First Nation. Therefore, the Harvester receptor in the model uses the intake rates from the Sagkeeng First Nation Indigenous food intake survey.

The harvester is assumed to spend 2 hours per week at or near the site, all outdoors; thus outdoor occupancy factor and shoreline occupancy factor are both 1.19% (2 hours per week). The sediment exposure frequency is 52 days per year (1 day each week).

Table 4-5: Human Exposure Factors for Radiological Dose Calculations for Farm Receptor

Exposure Factor	Units	3 Month Old Infant (nursing)	3 Month Old Infant (formula)	Infant 1 year (cow's milk)	Infant 1 year (formula)	Child 10 year	Adult	Reference in CSA N288.1-14
Inhalation rate	m^3/a	770 *	770 *	1830	1830	5660	5950	Table 19
Incidental soil ingestion rates	g dw/d	3.8E-5 *	3.8E-5 *	0.061	0.061	0.055	0.004	Table 20
Incidental ingestion of sediment	g dw/d	3.8E-5 *	3.8E-5 *	0.061	0.061	0.055	0.004	Table 20
Drinking water intake rates	L/a	0	132.13 *	98.9	98.9	151.1	379.6	Table 21
Fish intake rate	g fw/d	0	0	4.6	4.6	13.2	18.8	Table G.9b
Total Aquatic animal intake rate	g fw/d	0	0	4.6	4.6	13.2	18.8	Table G.9b
Beef	g fw/d	0	0	12.1	12.1	35.9	125.5	Table G.9b
Beef Offal	g fw/d	0	0	1.4	1.4	3.9	5.6	Table G.9b
Veal	g fw/d	0	0	0.7	0.7	2.1	4.4	Table G.9b
Pork	g fw/d	0	0	9.6	9.6	28.6	54.3	Table G.9b
Lamb	g fw/d	0	0	0	0	2.8	1.6	Table G.9b
Poultry	g fw/d	0	0	22.6	22.6	59.9	106.5	Table G.9b
Egg	g fw/d	0	0	5.8	5.8	22.1	52.7	Table G.9b
Deer	g fw/d	0	0	0.02	0.02	0.07	0.25	Table G.9b
Rabbit	g fw/d	0	0	0.06	0.06	0.18	0.63	Table G.9b
Milk	g fw/d	985 *	0	665	0	625	344.1	Table G.9b
Honey	g fw/d	0	0	1.3	1.3	3.7	4.4	Table G.9b
Total Terrestrial animal intake rate	g fw/d	0	0	719	54	784	700	Table G.9b
Grains	g fw/d	0	0	151.2	151.2	385.5	447.9	Table G.9b
Fruit and Berries	g fw/d	0	0	149.7	149.7	243.3	272.4	Table G.9b
Vegetables	g fw/d	0	0	70.7	70.7	190.9	351.0	Table G.9b
Mushrooms	g fw/d	0	0	0.7	0.7	2.8	3.2	Table G.9b
Potatoes	G" fw/d	0	0	23.7	23.7	84.6	131.1	Table G.9b
Total terrestrial plant intake rates	g fw/d	0	0	396	396	907	1206	Table G.9b
Outdoor occupancy factor	NA	0.2	0.2	0.2	0.2	0.2	0.2	Clause 6.14.3
Water occupancy factor	NA	0	0	0	0	0.0104	0.0104	Assumption (3 months)

Exposure Factor	Units	3 Month Old Infant (nursing)	3 Month Old Infant (formula)	Infant 1 year (cow's milk)	Infant 1 year (formula)	Child 10 year	Adult	Reference in CSA N288.1-14
Skin surface area	m^2	0.44 *	0.44 *	0.72	0.72	1.46	2.19	Table 22
Soil reduction factor	NA	0.68	0.68	0.68	0.68	0.68	0.68	Clause 6.4.6.3
Dilution factor for sediments	NA	1.0	1.0	1.0	1.0	1.0	1.0	Clause 7.10.4
Bathing occupancy factor	NA	0.014	0.014	0.014	0.014	0.014	0.014	Clause 6.16.1.3
Bathtub correction factor	NA	0.7	0.7	0.7	0.7	0.7	0.7	Clause 6.16.1.2
Pool swim occupancy factor (surface water)	NA	0	0	0	0	0.031	0.031	Assumption (9 months)
Pool swim occupancy factor (groundwater)	NA	0	0	0	0	0.0104	0.0104	Assumption (3 months)
Shoreline occupancy factor	NA	0.02	0.02	0.02	0.02	0.02	0.02	Clause 7.10.4
Soil exposure frequency	d/a	135	135	135	135	135	135	Clause 6.15.4.3
Sediment exposure frequency	d/a	45	45	45	45	45	45	Clause 6.15.4.3

Notes:

* Reference is COG DRL Guidance Document (COG 2013)

"dw" indicates dry weight and "fw" indicates fresh weight.

Table 4-6: Specific Human Exposure Factors for Harvester

Exposure Factor	Units[(4)]	Infant 1 year	Child 10 year	Adult	Reference[2]
Fish intake rate	g fw/d	7.8	22.4	31.9	CNL 2018a (The child and infant intake rates were scaled down based on the ratios for adult, child and infant intake rates in CSA N288.1-14)
Total Aquatic animal intake rate	g fw/d	7.8	22.4	31.9	
Deer intake rate	g fw/d	2.2	6.6	14.8	
Rabbit intake rate	g fw/d	1.0	3.1	6.9	
Duck intake rate	g fw/d	0.6	1.9	4.2	
Total Terrestrial animal intake rate	g fw/d	3.9	11.6	25.8	
Fruits and Berries	g fw/d	17.0	39.0	51.8	
Weekay	g fw/d	1.6	3.7	5.0	
Cedar	g fw/d	3.2	7.2	9.6	
Total terrestrial plant intake rates [1]	g fw/d	21.8	49.9	66.4	

Notes:
1. The total terrestrial plant intake is entered in IMPACT; the fractions consisting of fruits and berries, weekay, and cedar are separate input values.
2. The adult intake rates were obtained from the Indigenous Food Intake Survey (CNL 2018a). The child and infant intake rates were scaled down based on the adult intake rate.

4.2.4.1 Dose Coefficients

The radionuclides released from groundwater to surface water, according to the groundwater model (Section 6.3.2 of the EIS) were reviewed against the list of radionuclides in CSA N288.1-14, (2014) which are in the IMPACT™ code database. The dose coefficients used are the progeny-inclusive dose coefficients from Annex C of N288.1-14. These values incorporate all progeny that impart a dose that is significant compared to the parent dose. They take into account all members of the decay chain for decay and ingrowth times defined in CSA N288.1-14. The inhalation dose coefficients for tritium have been increased by 50% to account for skin absorption, as per Clause 6.13.1 in CSA N288.1-14 (CSA 2014). Any radionuclides not already included in the IMPACT™ database were added with appropriate parameter values (including Ac-225, Ac-227, Ag-108m, Bi-210, Ca-41, Gd-152, Ni-59, Pa-231, Pa-233, Pa-210, Pb-210, Po-210, Ra-223, Ra-224, Ra-225, Ra-228, Th-227, Th-230, Th-231). All dose coefficients used in the model are provided in Appendix B.

Human dose coefficients for the new radionuclides were taken from ICRP72 (1996) (internal dose coefficients) and from Eckerman and Ryman (1993) (external dose coefficients). Many of the new radionuclides have progeny, often in long chains, which are expected to grow in with time in physical media such as surface water, sediment and soil (after soil irrigation with surface water). Forty years of ingrowth was used to develop the progeny inclusive dose coefficients for each radionuclide, which is the timeframe used in CSA N288.1-14 for development of progeny-inclusive dose coefficients for sediment and soil exposure. Following CSA N288.1-14 methodology, the dose contributions of progeny were added to the dose coefficient of the parent, based on expected progeny activity relative to the parent, 40 years after parent release for beachshine and groundshine dose coefficients (sediment and soil exposure), and 1 day after release for water immersion dose

coefficients (surface water exposure). The latter is considered to be a reasonable timeframe for radionuclide transport via surface water from source to receptor locations.

4.2.5 Models

An environmental transport and pathways model, IMPACT™ Version 5.5.1, is used to evaluate the transport and effects of contaminants on the local environment including human and ecological receptors. IMPACT™ is a modelling tool, created, maintained and supported by EcoMetrix Incorporated (EcoMetrix). The IMPACT™ model is a customizable tool that allows the user to assess the transport and fate of COPCs through a user-specified environment. The model is used to estimate concentrations of COPCs in a range of media.

IMPACT™ Version 5.5.1 is consistent with the equations outlined in CSA N288.1 (2014) for pathways analysis and for calculation of radiological dose to humans. IMPACT™ uses specific activity models for tritium and C-14 as per CSA N288.1 (2014) and as recommended by CSA N288.6 (2012). The formation of organically bound tritium (OBT) in plants and animals from HTO is accounted for in the specific activity model for tritium and the dose from OBT is included in the dose results in IMPACT™.

The model was originally developed in 1993 as part of research projects funded by the AECB (now the CNSC). Since the initial development, the IMPACT™ software package has been continuously revised to improve the interface, the integration with various operating systems (OS), and most importantly to embody an up-to-date understanding of the fate, transport and dose impacts of radionuclides released to the environment. There are several built in libraries for parameters relevant to atmospheric dispersion, groundwater transport, soil processes, and water-sediment interaction. IMPACT™ can be used in various applications such as: human and ecological risk assessment; environmental impact assessments; pathways analysis; food-chain modeling; cumulative impacts; and derived release limits. IMPACT™ is able to model doses from emissions that can otherwise not be calculated from environmental measurements, including doses for future timeframes.

IMPACT™ was verified and validated in accordance with CSA N286.7 (1999). The IMPACT™ code is verified in the IMPACT™ 5.5.1 – Tool Qualification Report (EcoMetrix 2015).

IMPACT™ is designed to model routine, continuous and low-level emissions, and models transport of radionuclides through equilibrium partitioning. Time-dependent equations are used to model the soil compartment. Initial concentrations in environmental media (background concentrations) are not accounted for in the analysis. Thus, doses calculated from facility emissions are incremental doses.

The IMPACT™ code models radionuclide cycling through the biosphere from both airborne and waterborne effluent releases. For the closure phase, the atmospheric dispersion model was used. Releases to atmosphere were assumed to occur for the duration of the grouting or demolition periods. Dose modeling extended through the end of each period in order to capture the maximum concentrations in soil associated with the release. The soil type in

the model was represented by clay with a dry bulk density of 1400 kg-dw/m^3, consistent with N288.1-14, the WL DRL Report (CNL 2016b), and the geosynthesis describing local soil composition (CNL 2021a).

4.2.5.1 Atmospheric Dispersion

The concentration of COPCs in air is determined by the atmospheric release rate from the point of emission and a transfer parameter from the source to the air at a given receptor location (P_{01}). The long-term average value of the transfer parameter P_{01} is calculated based on a continuous release using a sector-averaged version of the Gaussian plume model. The model assumes that a laterally uniform concentration of radionuclides is distributed in each wind sector since wind meanders over prolonged periods of time (CSA 2014). The atmospheric model is governed by the following mathematical equation:

$$P_{01} = \frac{\sqrt{2}}{\sqrt{\pi} x \Delta\theta} \sum_{i,k} \left[\frac{F_{ijk} D_k}{u_k \Sigma_{zi}} \exp\left(\frac{-H_{ik}^2}{2\Sigma_{zi}^2} \right) \right]$$

where:

P_{01} = ground level transfer factor for receptor j (s/m^3)
x = distance between the source and receptor j (m)
$\Delta\theta$ = width of the sector over which the plume spreads (radians)
F_{ijk} = triple joint frequency of occurrence of stability class i and wind speed class k when the wind blows into the sector containing receptor j
D_k = factor that takes account of decay and ingrowth for wind speed class k
H_{ik} = effective release height for stability class i and wind speed class k (m)
Σ_{zi} = vertical dispersion parameter for stability class i, including spreading due to building wake effects (m), where z refers to the vertical axis
u_k = mean wind speed for speed class k (m/s)

COPCs in dust are dispersed and deposited to the soil. The soil model in CSA N288.1-14 is a dynamic model that incorporates the input of activity due to wet and dry deposition from air and loss due to decay, erosion, leaching, volatilization, and cropping (CSA 2014). Deposition from air to soil occurs over the modelling timeframe (6 months for demolition prior to grouting, and 1 year for grouting) and buildup of radionuclides in soil occurs over this time period. The transfer of COPCs from the air and soil to terrestrial plants is calculated using air-to-plant and soil-to-plant transfer factors. The COPCs are then transferred to terrestrial animals via inhalation (air), ingestion of water and food, and incidental ingestion of soil and sediment.

To model atmospheric releases during the closure phase the characteristics of the stack at WR-1 Complex and nearby buildings were consistent with the DRL Report (CNL 2016b); however, a ground level release was assumed since the WR-1 Complex stack will be removed during the closure phase. All input parameters are shown in Table 4-7.

Modelling was performed for two activities during closure: demolition (pre-grouting) and grouting. During both activities, modelling was performed assuming WR-1 Complex will still be intact; therefore, a nearby building height of 18.5 m was assumed.

Table 4-7: Source Characteristics for WR-1 Complex and Atmospheric Dispersion

Parameter	Value (Nearby Building Intact during Demolition and Grouting)[1]
Physical Height of Release (m)	0
Stack Inside Diameter (m)	1.98
Stack Exit Velocity (m/s)	4.6
Stack Gas Temperature (°C)	25
Ambient Air Temperature (°C)	0.4
Height of Nearby Building (m)	18.5
Smallest Horizontal Dimension of Nearby Building (m)	55
Cross-Sectional Area of Nearby Building (m^2)	1000

Notes:
1. Values obtained from Table 6-1 in CNL 2016b

4.2.5.1.1 Meteorological Data

Meteorological data used for the assessment were from the Environment Canada and Climate Change (ECCC) meteorological station in Pinawa, Manitoba from 2011 to 2015, provided as double-joint frequencies. Since IMPACT™ requires triple-joint frequencies, it was assumed that the frequencies were uniformly distributed over the six stability classes. Wind data for the Pinawa meteorological station at the 10-m elevation for the period 2011 to 2015 (wind blowing “from”) are presented as a wind rose in Figure 4-4.

4.2.5.1.2 Deposition from Air and Transfer to Other Media

From the modelled COPC concentrations in air at any location, the IMPACT™ model also calculates COPC deposition to soil and plants and pond water, the accumulation over time in soil, and the partitioning of COPCs from soil to groundwater, and to plants and animals. The pathways are illustrated in Figure 4-2 and Figure 4-3. The equations are described in CSA N288.1 (2014).

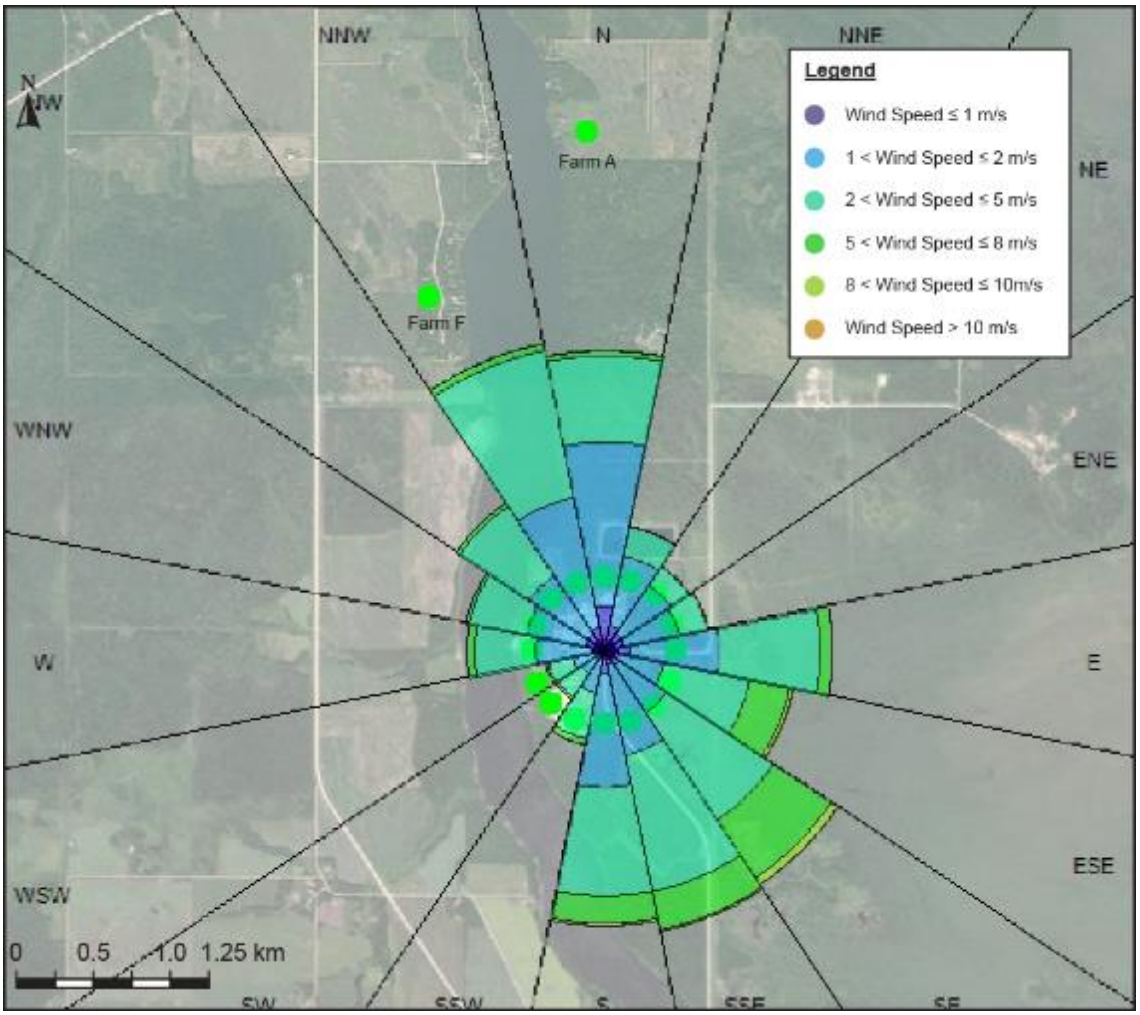


Figure 4-4: 2011 - 2015 Annual Average Windrose at 10-m Tower (blowing from)

4.2.5.2 Well and Pond Models

For the closure phase, the conceptual well model from N288.1-14 (CSA 2014) has been used assuming atmospheric release transferred via infiltration from the soil zone to groundwater (see Clause 6.5 in N288.1-14). For receptors included in the closure phase, all water for drinking, irrigation, bathing, etc. comes from well water with the exception of the deer that drinks from pond water. Therefore, a shallow pond has also been included in the model. The pond is similar to the well but is also influenced by precipitation and evaporation (see Clause 6.6 in N288.1-14). The well depth was assumed to be 6 m and the farm pond was assumed to be 5,000 m^2 with a 2 m depth, consistent with the DRL Report (CNL 2016b).

4.2.6 Exposure Point Concentrations and Doses

The radiological release rates, receptor characteristics, and the exposure factors detailed in the previous sections, were used as inputs into the IMPACT™ model to predict the radiological doses to human receptors during the closure phase. The radiological doses to

all human receptors identified are presented for the closure phase during demolition prior to grouting and during grouting for both maximum and average atmospheric release scenarios (see Table 4-8 through Table 4-23). Doses are generally presented for three age groups: adult, child, and infant (1 year old). Doses are also presented for a 3 month old nursing infant versus a 3 month old formula fed infant. Sample calculations are presented in Appendix C.

The characteristics of Farm A and Farm F are the same except for their locations (see Figure 4-1). Radiological doses presented for Farm F are considered bounding for Farm A, as modelling indicated that radiological doses to residents at Farm F would be higher than at Farm A; therefore, radiological doses are presented only for Farm F.

Table 4-8: Estimated Radiation Dose for On-Site Receptor during Demolition Prior to Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult On-Site (Worker)	Ag-108m	mSv/a	3.69E-11	1.25E-12	0.00E+00	0.00E+00	2.46E-16	7.14E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-10
	Am-241	mSv/a	2.71E-03	1.39E-10	0.00E+00	0.00E+00	2.78E-10	1.33E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-03
	Am-243	mSv/a	2.39E-06	3.44E-13	0.00E+00	0.00E+00	2.51E-13	1.04E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-06
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.74E-05	6.97E-15	0.00E+00	0.00E+00	1.65E-12	3.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05
	Co-60	mSv/a	7.48E-09	2.83E-10	0.00E+00	0.00E+00	5.29E-14	1.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-07
	Cs-137	mSv/a	6.79E-06	1.20E-07	0.00E+00	0.00E+00	4.10E-10	7.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-05
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	6.35E-07	2.19E-09	0.00E+00	0.00E+00	5.06E-13	1.22E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-06
	Eu-155	mSv/a	1.02E-08	1.00E-11	0.00E+00	0.00E+00	9.80E-15	6.76E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-08
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-06
	I-129	mSv/a	8.26E-11	7.70E-16	0.00E+00	0.00E+00	3.55E-15	2.59E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.52E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	7.78E-08	9.55E-15	0.00E+00	0.00E+00	7.96E-15	6.31E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.78E-08
	Np-239	mSv/a	5.43E-11	1.29E-12	0.00E+00	0.00E+00	1.88E-17	1.49E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.05E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	3.54E-04	8.53E-14	0.00E+00	0.00E+00	3.80E-11	4.27E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.54E-04
	Pu-239	mSv/a	9.38E-04	2.08E-13	0.00E+00	0.00E+00	1.01E-10	4.72E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-04
	Pu-240	mSv/a	1.34E-03	2.91E-13	0.00E+00	0.00E+00	1.44E-10	1.43E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-03
	Pu-241	mSv/a	5.53E-04	1.24E-13	0.00E+00	0.00E+00	6.27E-11	2.32E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-04
	Sr-90	mSv/a	3.43E-05	4.50E-09	0.00E+00	0.00E+00	5.68E-10	5.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-05
	Tc-99	mSv/a	1.60E-09	6.09E-14	0.00E+00	0.00E+00	2.21E-15	5.10E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-09
	U-235	mSv/a	5.49E-09	3.64E-14	0.00E+00	0.00E+00	1.79E-15	2.44E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.51E-09
	U-238	mSv/a	1.11E-07	3.03E-16	0.00E+00	0.00E+00	3.69E-14	3.93E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-07
	Total	**mSv/a**	**5.96E-03**	**1.28E-07**	**0.00E+00**	**0.00E+00**	**1.60E-09**	**7.91E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**6.04E-03**

Table 4-9: Estimated Radiation Dose for On-Site Receptor during Demolition Prior to Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult On-Site (Worker)	Ag-108m	mSv/a	9.69E-12	3.29E-13	0.00E+00	0.00E+00	6.47E-17	1.88E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-10
	Am-241	mSv/a	7.13E-04	3.64E-11	0.00E+00	0.00E+00	7.30E-11	3.51E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-04
	Am-243	mSv/a	6.29E-07	9.04E-14	0.00E+00	0.00E+00	6.61E-14	2.75E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	4.58E-06	1.83E-15	0.00E+00	0.00E+00	4.34E-13	9.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-06
	Co-60	mSv/a	1.97E-09	7.45E-11	0.00E+00	0.00E+00	1.39E-14	3.88E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-08
	Cs-137	mSv/a	1.78E-06	3.16E-08	0.00E+00	0.00E+00	1.08E-10	1.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-05
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.67E-07	5.75E-10	0.00E+00	0.00E+00	1.33E-13	3.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-07
	Eu-155	mSv/a	2.68E-09	2.64E-12	0.00E+00	0.00E+00	2.58E-15	1.78E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	4.56E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-07
	I-129	mSv/a	2.17E-11	2.02E-16	0.00E+00	0.00E+00	9.32E-16	6.81E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	2.04E-08	2.51E-15	0.00E+00	0.00E+00	2.09E-15	1.66E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-08
	Np-239	mSv/a	1.43E-11	3.39E-13	0.00E+00	0.00E+00	4.94E-18	3.92E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	9.29E-05	2.24E-14	0.00E+00	0.00E+00	9.98E-12	1.12E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.29E-05
	Pu-239	mSv/a	2.46E-04	5.47E-14	0.00E+00	0.00E+00	2.65E-11	1.24E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04
	Pu-240	mSv/a	3.52E-04	7.66E-14	0.00E+00	0.00E+00	3.78E-11	3.76E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-04
	Pu-241	mSv/a	1.45E-04	3.26E-14	0.00E+00	0.00E+00	1.65E-11	6.11E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-04
	Sr-90	mSv/a	9.02E-06	1.18E-09	0.00E+00	0.00E+00	1.49E-10	1.36E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-05
	Tc-99	mSv/a	4.20E-10	1.60E-14	0.00E+00	0.00E+00	5.80E-16	1.34E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-10
	U-235	mSv/a	1.44E-09	9.57E-15	0.00E+00	0.00E+00	4.70E-16	6.42E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-09
	U-238	mSv/a	2.91E-08	7.97E-17	0.00E+00	0.00E+00	9.69E-15	1.03E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-08
	Total	**mSv/a**	**1.57E-03**	**3.35E-08**	**0.00E+00**	**0.00E+00**	**4.22E-10**	**2.08E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.59E-03**

Table 4-10: Estimated Radiation Dose for Harvester during Demolition Prior to Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ag-108m	mSv/a	3.85E-13	2.18E-14	0.00E+00	0.00E+00	1.05E-16	2.62E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.79E-11	2.87E-12	9.74E-11
	Am-241	mSv/a	2.83E-05	2.41E-12	0.00E+00	0.00E+00	1.19E-10	4.90E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.97E-07	2.36E-07	2.95E-05
	Am-243	mSv/a	2.50E-08	5.99E-15	0.00E+00	0.00E+00	1.08E-13	3.84E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.02E-10	2.13E-10	2.62E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.82E-07	1.21E-16	0.00E+00	0.00E+00	7.07E-13	1.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-09	8.59E-10	1.89E-07
	Co-60	mSv/a	7.81E-11	4.93E-12	0.00E+00	0.00E+00	2.27E-14	5.43E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-09	2.32E-09	9.39E-09
	Cs-137	mSv/a	7.09E-08	2.09E-09	0.00E+00	0.00E+00	1.76E-10	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04	3.08E-03	3.19E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	6.63E-09	3.81E-11	0.00E+00	0.00E+00	2.17E-13	4.48E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-08	3.25E-08	9.85E-08
	Eu-155	mSv/a	1.06E-10	1.75E-13	0.00E+00	0.00E+00	4.20E-15	2.48E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E-10	6.38E-10	1.28E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.57E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-07	3.07E-08	2.50E-07
	I-129	mSv/a	8.63E-13	1.34E-17	0.00E+00	0.00E+00	1.20E-15	7.54E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-10	9.46E-10	1.19E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	8.12E-10	1.66E-16	0.00E+00	0.00E+00	3.41E-15	2.32E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-10	1.85E-11	1.06E-09
	Np-239	mSv/a	5.67E-13	2.24E-14	0.00E+00	0.00E+00	8.04E-18	5.48E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-12	3.74E-13	4.31E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-08	3.35E-09	3.77E-08
	Pu-238	mSv/a	3.69E-06	1.48E-15	0.00E+00	0.00E+00	1.63E-11	1.57E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-07	3.49E-08	3.86E-06
	Pu-239	mSv/a	9.79E-06	3.62E-15	0.00E+00	0.00E+00	4.32E-11	1.74E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-07	9.25E-08	1.02E-05
	Pu-240	mSv/a	1.40E-05	5.07E-15	0.00E+00	0.00E+00	6.16E-11	5.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.16E-07	1.32E-07	1.46E-05
	Pu-241	mSv/a	5.78E-06	2.16E-15	0.00E+00	0.00E+00	2.69E-11	8.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-07	5.81E-08	6.07E-06
	Sr-90	mSv/a	3.58E-07	4.70E-11	0.00E+00	0.00E+00	2.43E-10	3.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-04	7.60E-05	2.38E-04
	Tc-99	mSv/a	1.67E-11	6.35E-16	0.00E+00	0.00E+00	9.45E-16	3.38E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-09	7.40E-11	1.67E-09
	U-235	mSv/a	5.73E-11	6.34E-16	0.00E+00	0.00E+00	7.66E-16	8.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-11	3.47E-09	3.58E-09
	U-238	mSv/a	1.15E-09	5.28E-18	0.00E+00	0.00E+00	1.58E-14	1.44E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-09	7.16E-08	7.38E-08
	Total	**mSv/a**	**6.22E-05**	**2.19E-09**	**0.00E+00**	**0.00E+00**	**6.87E-10**	**3.06E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.78E-04**	**3.16E-03**	**3.50E-03**
Child-10y-Harvester	Ag-108m	mSv/a	5.44E-13	2.18E-14	0.00E+00	0.00E+00	2.71E-15	2.62E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.55E-11	2.40E-12	1.25E-10
	Am-241	mSv/a	2.56E-05	2.41E-12	0.00E+00	0.00E+00	1.80E-09	4.90E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.25E-07	1.16E-07	2.66E-05
	Am-243	mSv/a	2.32E-08	5.99E-15	0.00E+00	0.00E+00	1.63E-12	3.84E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-10	1.05E-10	2.41E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.73E-07	1.21E-16	0.00E+00	0.00E+00	1.13E-11	1.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-09	4.48E-10	1.79E-07
	Co-60	mSv/a	1.11E-10	4.93E-12	0.00E+00	0.00E+00	1.01E-12	5.43E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-09	3.36E-09	1.27E-08
	Cs-137	mSv/a	5.42E-08	2.09E-09	0.00E+00	0.00E+00	1.86E-09	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.58E-05	1.06E-03	1.13E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	7.74E-09	3.81E-11	0.00E+00	0.00E+00	6.10E-12	4.48E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-08	2.98E-08	1.05E-07
	Eu-155	mSv/a	1.35E-10	1.75E-13	0.00E+00	0.00E+00	1.23E-13	2.48E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-10	6.07E-10	1.45E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-07	1.72E-08	2.28E-07
	I-129	mSv/a	1.45E-12	1.34E-17	0.00E+00	0.00E+00	2.86E-14	7.54E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-10	7.31E-10	1.04E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	7.39E-10	1.66E-16	0.00E+00	0.00E+00	4.69E-14	2.32E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-10	8.28E-12	9.20E-10
	Np-239	mSv/a	8.11E-13	2.24E-14	0.00E+00	0.00E+00	2.35E-16	5.48E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-12	3.56E-13	6.22E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.54E-08	2.05E-09	3.75E-08
	Pu-238	mSv/a	3.36E-06	1.48E-15	0.00E+00	0.00E+00	2.33E-10	1.57E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-07	1.63E-08	3.48E-06
	Pu-239	mSv/a	8.94E-06	3.62E-15	0.00E+00	0.00E+00	6.41E-10	1.74E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-07	4.47E-08	9.28E-06
	Pu-240	mSv/a	1.28E-05	5.07E-15	0.00E+00	0.00E+00	9.15E-10	5.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E-07	6.37E-08	1.32E-05
	Pu-241	mSv/a	5.07E-06	2.16E-15	0.00E+00	0.00E+00	3.93E-10	8.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-07	2.76E-08	5.29E-06
	Sr-90	mSv/a	4.83E-07	4.70E-11	0.00E+00	0.00E+00	7.17E-09	3.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-04	7.28E-05	3.34E-04
	Tc-99	mSv/a	2.26E-11	6.35E-16	0.00E+00	0.00E+00	2.64E-14	3.38E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-09	6.72E-11	2.50E-09
	U-235	mSv/a	7.56E-11	6.34E-16	0.00E+00	0.00E+00	1.59E-14	8.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.77E-11	2.35E-09	2.48E-09
	U-238	mSv/a	1.51E-09	5.28E-18	0.00E+00	0.00E+00	3.28E-13	1.44E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-09	4.84E-08	5.11E-08
	Total	**mSv/a**	**5.65E-05**	**2.19E-09**	**0.00E+00**	**0.00E+00**	**1.30E-08**	**3.06E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.29E-04**	**1.13E-03**	**1.52E-03**
Infant_1y-Havester	Ag-108m	mSv/a	4.32E-13	2.83E-14	0.00E+00	0.00E+00	7.68E-15	3.41E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-10	2.06E-12	1.43E-10
	Am-241	mSv/a	1.43E-05	3.14E-12	0.00E+00	0.00E+00	3.36E-09	6.38E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-07	6.57E-08	1.50E-05
	Am-243	mSv/a	1.28E-08	7.78E-15	0.00E+00	0.00E+00	3.04E-12	4.99E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-10	5.94E-11	1.34E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.18E-07	1.58E-16	0.00E+00	0.00E+00	2.61E-11	1.74E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-09	3.13E-10	1.23E-07
	Co-60	mSv/a	8.16E-11	6.41E-12	0.00E+00	0.00E+00	2.75E-12	7.06E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-09	2.78E-09	1.40E-08
	Cs-137	mSv/a	2.56E-08	2.72E-09	0.00E+00	0.00E+00	2.47E-09	3.45E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-05	4.28E-04	4.66E-04

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	5.78E-09	4.95E-11	0.00E+00	0.00E+00	1.98E-11	5.82E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-08	2.93E-08	1.22E-07
	Eu-155	mSv/a	1.09E-10	2.27E-13	0.00E+00	0.00E+00	4.40E-13	3.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-10	6.60E-10	1.74E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-07	1.22E-08	2.03E-07
	I-129	mSv/a	5.53E-13	1.74E-17	0.00E+00	0.00E+00	3.67E-14	9.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-10	2.85E-10	4.43E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	4.34E-10	2.16E-16	0.00E+00	0.00E+00	9.92E-14	3.02E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-10	5.32E-12	5.85E-10
	Np-239	mSv/a	7.87E-13	2.91E-14	0.00E+00	0.00E+00	8.73E-16	7.12E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-12	4.01E-13	8.49E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-08	1.43E-09	3.33E-08
	Pu-238	mSv/a	1.83E-06	1.93E-15	0.00E+00	0.00E+00	4.31E-10	2.04E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.79E-08	9.13E-09	1.91E-06
	Pu-239	mSv/a	4.64E-06	4.71E-15	0.00E+00	0.00E+00	1.11E-09	2.26E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-07	2.34E-08	4.86E-06
	Pu-240	mSv/a	6.61E-06	6.59E-15	0.00E+00	0.00E+00	1.58E-09	6.83E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-07	3.34E-08	6.93E-06
	Pu-241	mSv/a	1.92E-06	2.81E-15	0.00E+00	0.00E+00	4.87E-10	1.11E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-08	1.04E-08	2.03E-06
	Sr-90	mSv/a	3.37E-07	4.70E-11	0.00E+00	0.00E+00	9.67E-09	3.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-04	2.98E-05	1.69E-04
	Tc-99	mSv/a	1.67E-11	6.35E-16	0.00E+00	0.00E+00	1.08E-13	3.38E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.89E-09	8.35E-11	3.99E-09
	U-235	mSv/a	5.69E-11	8.23E-16	0.00E+00	0.00E+00	3.23E-14	1.17E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.62E-11	1.45E-09	1.55E-09
	U-238	mSv/a	1.15E-09	6.86E-18	0.00E+00	0.00E+00	6.42E-13	1.88E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.17E-10	2.87E-08	3.08E-08
	Total	**mSv/a**	**2.98E-05**	**2.83E-09**	**0.00E+00**	**0.00E+00**	**1.92E-08**	**3.88E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.74E-04**	**4.58E-04**	**6.66E-04**

Table 4-11: Estimated Radiation Dose for Harvester during Demolition Prior to Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ag-108m	mSv/a	1.01E-13	5.72E-15	0.00E+00	0.00E+00	2.77E-17	6.90E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-11	7.53E-13	2.56E-11
	Am-241	mSv/a	7.44E-06	6.34E-13	0.00E+00	0.00E+00	3.13E-11	1.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-07	6.20E-08	7.77E-06
	Am-243	mSv/a	6.57E-09	1.57E-15	0.00E+00	0.00E+00	2.83E-14	1.01E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-10	5.61E-11	6.88E-09
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	4.78E-08	3.19E-17	0.00E+00	0.00E+00	1.86E-13	3.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-09	2.26E-10	4.96E-08
	Co-60	mSv/a	2.05E-11	1.30E-12	0.00E+00	0.00E+00	5.96E-15	1.43E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-10	6.10E-10	2.47E-09
	Cs-137	mSv/a	1.86E-08	5.51E-10	0.00E+00	0.00E+00	4.62E-11	6.97E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-05	8.09E-04	8.40E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.74E-09	1.00E-11	0.00E+00	0.00E+00	5.69E-14	1.18E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.83E-09	8.54E-09	2.59E-08
	Eu-155	mSv/a	2.79E-11	4.59E-14	0.00E+00	0.00E+00	1.10E-15	6.53E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-11	1.68E-10	3.36E-10
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	4.76E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-08	9.31E-09	7.60E-08
	I-129	mSv/a	2.27E-13	3.52E-18	0.00E+00	0.00E+00	3.16E-16	1.98E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.28E-11	2.49E-10	3.12E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	2.13E-10	4.37E-17	0.00E+00	0.00E+00	8.96E-16	6.10E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-11	4.86E-12	2.79E-10
	Np-239	mSv/a	1.49E-13	5.89E-15	0.00E+00	0.00E+00	2.11E-18	1.44E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.37E-13	9.84E-14	1.13E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-08	1.02E-09	1.14E-08
	Pu-238	mSv/a	9.70E-07	3.90E-16	0.00E+00	0.00E+00	4.27E-12	4.12E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-08	9.16E-09	1.02E-06
	Pu-239	mSv/a	2.57E-06	9.51E-16	0.00E+00	0.00E+00	1.14E-11	4.56E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.51E-08	2.43E-08	2.69E-06
	Pu-240	mSv/a	3.67E-06	1.33E-15	0.00E+00	0.00E+00	1.62E-11	1.38E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-07	3.47E-08	3.84E-06
	Pu-241	mSv/a	1.52E-06	5.67E-16	0.00E+00	0.00E+00	7.06E-12	2.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-08	1.53E-08	1.60E-06
	Sr-90	mSv/a	9.42E-08	1.24E-11	0.00E+00	0.00E+00	6.39E-11	9.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-05	2.00E-05	6.27E-05
	Tc-99	mSv/a	4.39E-12	1.67E-16	0.00E+00	0.00E+00	2.48E-16	8.87E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-10	1.94E-11	4.39E-10
	U-235	mSv/a	1.51E-11	1.67E-16	0.00E+00	0.00E+00	2.01E-16	2.36E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-11	9.13E-10	9.41E-10
	U-238	mSv/a	3.03E-10	1.39E-18	0.00E+00	0.00E+00	4.15E-15	3.80E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-10	1.88E-08	1.94E-08
	Total	**mSv/a**	**1.63E-05**	**5.75E-10**	**0.00E+00**	**0.00E+00**	**1.81E-10**	**8.04E-07**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**7.31E-05**	**8.29E-04**	**9.19E-04**
Child-10y-Harvester	Ag-108m	mSv/a	1.43E-13	5.72E-15	0.00E+00	0.00E+00	7.12E-16	6.90E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-11	6.30E-13	3.28E-11
	Am-241	mSv/a	6.74E-06	6.34E-13	0.00E+00	0.00E+00	4.73E-10	1.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-07	3.05E-08	6.99E-06
	Am-243	mSv/a	6.10E-09	1.57E-15	0.00E+00	0.00E+00	4.28E-13	1.01E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-10	2.76E-11	6.33E-09
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	4.55E-08	3.19E-17	0.00E+00	0.00E+00	2.98E-12	3.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-09	1.18E-10	4.70E-08
	Co-60	mSv/a	2.93E-11	1.30E-12	0.00E+00	0.00E+00	2.65E-13	1.43E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.94E-10	8.84E-10	3.34E-09
	Cs-137	mSv/a	1.43E-08	5.51E-10	0.00E+00	0.00E+00	4.88E-10	6.97E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	2.78E-04	2.96E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	2.03E-09	1.00E-11	0.00E+00	0.00E+00	1.60E-12	1.18E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-09	7.83E-09	2.76E-08
	Eu-155	mSv/a	3.54E-11	4.59E-14	0.00E+00	0.00E+00	3.22E-14	6.53E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-10	1.59E-10	3.80E-10
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	5.66E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-08	5.21E-09	6.91E-08
	I-129	mSv/a	3.82E-13	3.52E-18	0.00E+00	0.00E+00	7.51E-15	1.98E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-11	1.92E-10	2.74E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.94E-10	4.37E-17	0.00E+00	0.00E+00	1.23E-14	6.10E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.49E-11	2.18E-12	2.42E-10
	Np-239	mSv/a	2.13E-13	5.89E-15	0.00E+00	0.00E+00	6.17E-17	1.44E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-12	9.35E-14	1.63E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-08	6.23E-10	1.14E-08
	Pu-238	mSv/a	8.83E-07	3.90E-16	0.00E+00	0.00E+00	6.13E-11	4.12E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-08	4.28E-09	9.15E-07
	Pu-239	mSv/a	2.35E-06	9.51E-16	0.00E+00	0.00E+00	1.69E-10	4.56E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-08	1.17E-08	2.44E-06
	Pu-240	mSv/a	3.35E-06	1.33E-15	0.00E+00	0.00E+00	2.40E-10	1.38E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-07	1.68E-08	3.48E-06
	Pu-241	mSv/a	1.33E-06	5.67E-16	0.00E+00	0.00E+00	1.03E-10	2.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.77E-08	7.26E-09	1.39E-06
	Sr-90	mSv/a	1.27E-07	1.24E-11	0.00E+00	0.00E+00	1.88E-09	9.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.85E-05	1.91E-05	8.79E-05
	Tc-99	mSv/a	5.95E-12	1.67E-16	0.00E+00	0.00E+00	6.93E-15	8.87E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-10	1.77E-11	6.58E-10
	U-235	mSv/a	1.99E-11	1.67E-16	0.00E+00	0.00E+00	4.18E-15	2.36E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-11	6.17E-10	6.52E-10
	U-238	mSv/a	3.98E-10	1.39E-18	0.00E+00	0.00E+00	8.62E-14	3.80E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-10	1.27E-08	1.34E-08
	Total	**mSv/a**	**1.49E-05**	**5.75E-10**	**0.00E+00**	**0.00E+00**	**3.42E-09**	**8.04E-07**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.64E-05**	**2.98E-04**	**4.00E-04**
Infant_1y-Havester	Ag-108m	mSv/a	1.13E-13	7.43E-15	0.00E+00	0.00E+00	2.02E-15	8.96E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-11	5.42E-13	3.77E-11
	Am-241	mSv/a	3.76E-06	8.25E-13	0.00E+00	0.00E+00	8.82E-10	1.68E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-07	1.73E-08	3.94E-06
	Am-243	mSv/a	3.35E-09	2.04E-15	0.00E+00	0.00E+00	7.98E-13	1.31E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-10	1.56E-11	3.53E-09
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	3.11E-08	4.14E-17	0.00E+00	0.00E+00	6.85E-12	4.58E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-09	8.21E-11	3.24E-08
	Co-60	mSv/a	2.15E-11	1.69E-12	0.00E+00	0.00E+00	7.22E-13	1.86E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-09	7.30E-10	3.67E-09
	Cs-137	mSv/a	6.73E-09	7.15E-10	0.00E+00	0.00E+00	6.50E-10	9.08E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-06	1.12E-04	1.22E-04

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.52E-09	1.30E-11	0.00E+00	0.00E+00	5.21E-12	1.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.56E-09	7.71E-09	3.21E-08
	Eu-155	mSv/a	2.86E-11	5.97E-14	0.00E+00	0.00E+00	1.16E-13	8.49E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-10	1.74E-10	4.57E-10
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	3.91E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-08	3.71E-09	6.15E-08
	I-129	mSv/a	1.45E-13	4.58E-18	0.00E+00	0.00E+00	9.65E-15	2.58E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E-11	7.49E-11	1.16E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.14E-10	5.68E-17	0.00E+00	0.00E+00	2.61E-14	7.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-11	1.40E-12	1.54E-10
	Np-239	mSv/a	2.07E-13	7.66E-15	0.00E+00	0.00E+00	2.30E-16	1.87E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-12	1.06E-13	2.23E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.68E-09	4.32E-10	1.01E-08
	Pu-238	mSv/a	4.80E-07	5.07E-16	0.00E+00	0.00E+00	1.13E-10	5.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-08	2.40E-09	5.03E-07
	Pu-239	mSv/a	1.22E-06	1.24E-15	0.00E+00	0.00E+00	2.91E-10	5.93E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-08	6.15E-09	1.28E-06
	Pu-240	mSv/a	1.74E-06	1.73E-15	0.00E+00	0.00E+00	4.15E-10	1.79E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.48E-08	8.77E-09	1.82E-06
	Pu-241	mSv/a	5.03E-07	7.37E-16	0.00E+00	0.00E+00	1.28E-10	2.92E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-08	2.73E-09	5.32E-07
	Sr-90	mSv/a	8.85E-08	1.24E-11	0.00E+00	0.00E+00	2.54E-09	9.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-05	7.84E-06	4.44E-05
	Tc-99	mSv/a	4.39E-12	1.67E-16	0.00E+00	0.00E+00	2.84E-14	8.87E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-09	2.20E-11	1.05E-09
	U-235	mSv/a	1.49E-11	2.16E-16	0.00E+00	0.00E+00	8.49E-15	3.07E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-11	3.80E-10	4.07E-10
	U-238	mSv/a	3.02E-10	1.80E-18	0.00E+00	0.00E+00	1.69E-13	4.93E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-10	7.55E-09	8.10E-09
	Total	**mSv/a**	**7.84E-06**	**7.43E-10**	**0.00E+00**	**0.00E+00**	**5.04E-09**	**1.02E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.59E-05**	**1.20E-04**	**1.75E-04**

Table 4-12: Estimated Radiation Dose for Farm F Resident during Demolition Prior to Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Farm F	Ag-108m	mSv/a	1.04E-11	3.53E-13	3.98E-16	4.96E-17	9.75E-17	2.83E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.85E-11	2.27E-10	5.99E-10
	Am-241	mSv/a	7.66E-04	3.92E-11	0.00E+00	0.00E+00	1.10E-10	5.28E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-07	7.47E-06	7.74E-04
	Am-243	mSv/a	6.76E-07	9.71E-14	1.79E-13	1.22E-17	9.96E-14	4.14E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.02E-10	6.76E-09	6.84E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	4.92E-06	1.97E-15	0.00E+00	0.00E+00	6.54E-13	1.45E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-09	2.82E-08	4.96E-06
	Co-60	mSv/a	2.11E-09	8.01E-11	0.00E+00	0.00E+00	2.10E-14	5.85E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-09	2.52E-08	8.77E-08
	Cs-137	mSv/a	1.92E-06	3.40E-08	0.00E+00	0.00E+00	1.62E-10	2.86E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	1.20E-03	1.36E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.79E-07	6.18E-10	0.00E+00	0.00E+00	2.00E-13	4.83E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-08	3.99E-08	7.19E-07
	Eu-155	mSv/a	2.88E-09	2.84E-12	0.00E+00	0.00E+00	3.88E-15	2.68E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-10	7.83E-10	6.66E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	4.25E-07	0.00E+00	6.87E-07	1.02E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-07	5.46E-07	2.07E-06
	I-129	mSv/a	2.33E-11	2.17E-16	5.80E-11	5.81E-16	1.01E-15	7.36E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-10	1.59E-08	1.62E-08
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	2.20E-08	2.70E-15	4.01E-11	1.51E-15	3.15E-15	2.50E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-10	2.10E-10	2.25E-08
	Np-239	mSv/a	1.53E-11	3.62E-13	0.00E+00	0.00E+00	7.41E-18	5.88E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-12	3.40E-12	2.81E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.68E-08	5.91E-08	1.26E-07
	Pu-238	mSv/a	9.98E-05	2.41E-14	0.00E+00	0.00E+00	1.50E-11	1.69E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-07	5.95E-07	1.01E-04
	Pu-239	mSv/a	2.65E-04	5.87E-14	1.47E-08	7.73E-16	4.00E-11	1.87E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-07	1.58E-06	2.67E-04
	Pu-240	mSv/a	3.78E-04	8.23E-14	4.78E-09	2.56E-16	5.70E-11	5.66E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-07	2.25E-06	3.80E-04
	Pu-241	mSv/a	1.56E-04	3.50E-14	0.00E+00	0.00E+00	2.49E-11	9.20E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-07	9.92E-07	1.58E-04
	Sr-90	mSv/a	9.69E-06	1.27E-09	1.77E-17	3.57E-22	2.25E-10	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-04	2.16E-04	4.16E-04
	Tc-99	mSv/a	4.51E-10	1.72E-14	2.02E-09	1.66E-13	8.74E-16	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-09	4.24E-09	9.36E-09
	U-235	mSv/a	1.55E-09	1.03E-14	1.78E-12	9.08E-16	7.09E-16	9.68E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.73E-11	1.72E-09	3.34E-09
	U-238	mSv/a	3.12E-08	8.57E-17	3.67E-11	1.09E-16	1.46E-14	1.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-09	3.54E-08	6.80E-08
	Total	**mSv/a**	**1.68E-03**	**3.60E-08**	**7.09E-07**	**1.02E-08**	**6.35E-10**	**3.13E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.22E-04**	**1.43E-03**	**3.46E-03**
Child-10y-Farm F	Ag-108m	mSv/a	1.47E-11	3.53E-13	2.96E-16	4.96E-17	2.51E-15	2.83E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.56E-11	6.13E-10	1.01E-09
	Am-241	mSv/a	6.94E-04	3.92E-11	0.00E+00	0.00E+00	1.66E-09	5.28E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.35E-07	4.64E-06	6.99E-04
	Am-243	mSv/a	6.28E-07	9.71E-14	7.84E-14	1.22E-17	1.51E-12	4.14E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-10	4.20E-09	6.33E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	4.68E-06	1.97E-15	0.00E+00	0.00E+00	1.05E-11	1.45E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-09	2.48E-08	4.71E-06
	Co-60	mSv/a	3.01E-09	8.01E-11	0.00E+00	0.00E+00	9.33E-13	5.85E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-09	5.00E-08	1.15E-07
	Cs-137	mSv/a	1.47E-06	3.40E-08	0.00E+00	0.00E+00	1.72E-09	2.86E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.59E-05	8.30E-04	9.26E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	2.09E-07	6.18E-10	0.00E+00	0.00E+00	5.65E-12	4.83E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-08	4.11E-08	7.56E-07
	Eu-155	mSv/a	3.65E-09	2.84E-12	0.00E+00	0.00E+00	1.13E-13	2.68E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-10	8.37E-10	7.61E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	5.05E-07	0.00E+00	3.42E-07	8.47E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-07	9.38E-07	2.12E-06
	I-129	mSv/a	3.93E-11	2.17E-16	3.99E-11	5.81E-16	2.39E-14	7.36E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-10	3.40E-08	3.43E-08
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	2.00E-08	2.70E-15	1.60E-11	1.51E-15	4.33E-14	2.50E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-10	1.32E-10	2.03E-08
	Np-239	mSv/a	2.18E-11	3.62E-13	0.00E+00	0.00E+00	2.16E-16	5.88E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-12	4.28E-12	3.68E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-08	6.66E-08	1.26E-07
	Pu-238	mSv/a	9.08E-05	2.41E-14	0.00E+00	0.00E+00	2.16E-10	1.69E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-08	5.91E-07	9.15E-05
	Pu-239	mSv/a	2.42E-04	5.87E-14	6.32E-09	7.73E-16	5.93E-10	1.87E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-07	1.62E-06	2.44E-04
	Pu-240	mSv/a	3.45E-04	8.23E-14	2.05E-09	2.56E-16	8.46E-10	5.66E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-07	2.32E-06	3.48E-04
	Pu-241	mSv/a	1.37E-04	3.50E-14	0.00E+00	0.00E+00	3.63E-10	9.20E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-07	1.00E-06	1.38E-04
	Sr-90	mSv/a	1.31E-05	1.27E-09	1.51E-17	3.57E-22	6.63E-09	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-04	6.49E-04	9.26E-04
	Tc-99	mSv/a	6.12E-10	1.72E-14	1.63E-09	1.66E-13	2.44E-14	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-09	6.72E-09	1.25E-08
	U-235	mSv/a	2.05E-09	1.03E-14	1.07E-12	9.08E-16	1.47E-14	9.68E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-11	2.63E-09	4.75E-09
	U-238	mSv/a	4.10E-08	8.57E-17	2.20E-11	1.09E-16	3.04E-13	1.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-09	5.43E-08	9.66E-08
	Total	**mSv/a**	**1.53E-03**	**3.60E-08**	**3.52E-07**	**8.47E-09**	**1.21E-08**	**3.13E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.30E-04**	**1.49E-03**	**3.38E-03**
Infant_1y-Farm F	Ag-108m	mSv/a	1.17E-11	4.59E-13	0.00E+00	3.13E-17	7.11E-15	3.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-10	1.56E-09	2.04E-09
	Am-241	mSv/a	3.87E-04	5.09E-11	0.00E+00	0.00E+00	3.10E-09	6.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-07	2.76E-06	3.90E-04
	Am-243	mSv/a	3.45E-07	1.26E-13	0.00E+00	7.65E-18	2.81E-12	5.38E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-10	2.50E-09	3.48E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	3.20E-06	2.56E-15	0.00E+00	0.00E+00	2.41E-11	1.88E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-09	1.86E-08	3.22E-06
	Co-60	mSv/a	2.21E-09	1.04E-10	0.00E+00	0.00E+00	2.54E-12	7.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-09	5.70E-08	1.39E-07
	Cs-137	mSv/a	6.92E-07	4.41E-08	0.00E+00	0.00E+00	2.29E-09	3.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-05	8.07E-04	8.77E-04

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.56E-07	8.03E-10	0.00E+00	0.00E+00	1.83E-11	6.28E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-08	6.53E-08	8.77E-07
	Eu-155	mSv/a	2.95E-09	3.69E-12	0.00E+00	0.00E+00	4.07E-13	3.48E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-10	1.47E-09	8.50E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	3.48E-07	0.00E+00	0.00E+00	5.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-07	1.94E-06	2.56E-06
	I-129	mSv/a	1.50E-11	2.83E-16	0.00E+00	3.66E-16	3.07E-14	9.57E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-10	3.65E-08	3.67E-08
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.17E-08	3.51E-15	0.00E+00	9.51E-16	9.18E-14	3.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-10	1.03E-10	1.20E-08
	Np-239	mSv/a	2.12E-11	4.71E-13	0.00E+00	0.00E+00	8.05E-16	7.64E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-12	5.99E-12	4.14E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-08	9.69E-08	1.39E-07
	Pu-238	mSv/a	4.94E-05	3.13E-14	0.00E+00	0.00E+00	3.99E-10	2.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E-08	5.23E-07	5.00E-05
	Pu-239	mSv/a	1.25E-04	7.64E-14	0.00E+00	4.87E-16	1.02E-09	2.43E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-07	1.34E-06	1.27E-04
	Pu-240	mSv/a	1.79E-04	1.07E-13	0.00E+00	1.62E-16	1.46E-09	7.36E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-07	1.91E-06	1.81E-04
	Pu-241	mSv/a	5.18E-05	4.55E-14	0.00E+00	0.00E+00	4.50E-10	1.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-08	5.95E-07	5.26E-05
	Sr-90	mSv/a	9.11E-06	1.27E-09	0.00E+00	1.73E-22	8.95E-09	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	7.83E-04	9.25E-04
	Tc-99	mSv/a	4.51E-10	1.72E-14	0.00E+00	8.05E-14	9.99E-14	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-09	1.78E-08	2.36E-08
	U-235	mSv/a	1.54E-09	1.34E-14	0.00E+00	5.72E-16	2.99E-14	1.26E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.26E-11	3.99E-09	5.58E-09
	U-238	mSv/a	3.11E-08	1.11E-16	0.00E+00	6.88E-17	5.94E-13	2.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.46E-10	7.93E-08	1.11E-07
	Total	**mSv/a**	**8.06E-04**	**4.64E-08**	**0.00E+00**	**5.08E-09**	**1.77E-08**	**4.02E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.65E-04**	**1.60E-03**	**2.61E-03**
Infant_1y-Formula-Farm F	Ag-108m	mSv/a	1.17E-11	4.59E-13	4.96E-16	3.13E-17	7.11E-15	3.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-10	5.36E-11	5.34E-10
	Am-241	mSv/a	3.87E-04	5.09E-11	0.00E+00	0.00E+00	3.10E-09	6.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-07	2.69E-06	3.90E-04
	Am-243	mSv/a	3.45E-07	1.26E-13	8.63E-14	7.65E-18	2.81E-12	5.38E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-10	2.43E-09	3.48E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	3.20E-06	2.56E-15	0.00E+00	0.00E+00	2.41E-11	1.88E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-09	1.72E-08	3.22E-06
	Co-60	mSv/a	2.21E-09	1.04E-10	0.00E+00	0.00E+00	2.54E-12	7.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-09	3.85E-08	1.21E-07
	Cs-137	mSv/a	6.92E-07	4.41E-08	0.00E+00	0.00E+00	2.29E-09	3.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-05	1.27E-04	1.98E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.56E-07	8.03E-10	0.00E+00	0.00E+00	1.83E-11	6.28E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-08	2.98E-08	8.41E-07
	Eu-155	mSv/a	2.95E-09	3.69E-12	0.00E+00	0.00E+00	4.07E-13	3.48E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-10	6.70E-10	7.70E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	3.48E-07	0.00E+00	4.75E-07	5.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-07	8.56E-08	1.18E-06

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	I-129	mSv/a	1.50E-11	2.83E-16	3.02E-11	3.66E-16	3.07E-14	9.57E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-10	2.25E-09	2.44E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.17E-08	3.51E-15	2.00E-11	9.51E-16	9.18E-14	3.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-10	7.94E-11	1.20E-08
	Np-239	mSv/a	2.12E-11	4.71E-13	0.00E+00	0.00E+00	8.05E-16	7.64E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-12	4.45E-12	3.99E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-08	2.38E-08	6.58E-08
	Pu-238	mSv/a	4.94E-05	3.13E-14	0.00E+00	0.00E+00	3.99E-10	2.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E-08	2.60E-07	4.97E-05
	Pu-239	mSv/a	1.25E-04	7.64E-14	6.43E-09	4.87E-16	1.02E-09	2.43E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-07	6.67E-07	1.26E-04
	Pu-240	mSv/a	1.79E-04	1.07E-13	2.09E-09	1.62E-16	1.46E-09	7.36E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-07	9.51E-07	1.80E-04
	Pu-241	mSv/a	5.18E-05	4.55E-14	0.00E+00	0.00E+00	4.50E-10	1.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-08	2.96E-07	5.23E-05
	Sr-90	mSv/a	9.11E-06	1.27E-09	1.20E-17	1.73E-22	8.95E-09	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	2.32E-05	1.66E-04
	Tc-99	mSv/a	4.51E-10	1.72E-14	3.95E-09	8.05E-14	9.99E-14	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-09	3.50E-09	1.32E-08
	U-235	mSv/a	1.54E-09	1.34E-14	1.28E-12	5.72E-16	2.99E-14	1.26E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.26E-11	5.30E-10	2.12E-09
	U-238	mSv/a	3.11E-08	1.11E-16	2.55E-11	6.88E-17	5.94E-13	2.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.46E-10	1.05E-08	4.27E-08
	Total	**mSv/a**	**8.06E-04**	**4.64E-08**	**4.87E-07**	**5.08E-09**	**1.77E-08**	**4.02E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.65E-04**	**1.55E-04**	**1.17E-03**

Table 4-13: Estimated Radiation Dose for Farm F Resident during Demolition Prior to Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Farm F	Ag-108m	mSv/a	2.74E-12	9.28E-14	1.05E-16	1.30E-17	2.56E-17	7.43E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-11	5.98E-11	1.58E-10
	Am-241	mSv/a	2.01E-04	1.03E-11	0.00E+00	0.00E+00	2.89E-11	1.39E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-07	1.96E-06	2.03E-04
	Am-243	mSv/a	1.78E-07	2.55E-14	4.71E-14	3.19E-18	2.62E-14	1.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-10	1.78E-09	1.80E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.29E-06	5.17E-16	0.00E+00	0.00E+00	1.72E-13	3.80E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-09	7.41E-09	1.30E-06
	Co-60	mSv/a	5.55E-10	2.10E-11	0.00E+00	0.00E+00	5.51E-15	1.54E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-10	6.63E-09	2.30E-08
	Cs-137	mSv/a	5.04E-07	8.94E-09	0.00E+00	0.00E+00	4.27E-11	7.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-05	3.15E-04	3.58E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	4.72E-08	1.62E-10	0.00E+00	0.00E+00	5.26E-14	1.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-09	1.05E-08	1.89E-07
	Eu-155	mSv/a	7.56E-10	7.46E-13	0.00E+00	0.00E+00	1.02E-15	7.04E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-11	2.06E-10	1.75E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.29E-07	0.00E+00	2.09E-07	3.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-07	1.66E-07	6.28E-07
	I-129	mSv/a	6.13E-12	5.71E-17	1.52E-11	1.53E-16	2.65E-16	1.94E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.91E-11	4.17E-09	4.26E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	5.77E-09	7.09E-16	1.05E-11	3.96E-16	8.29E-16	6.58E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.76E-11	5.53E-11	5.91E-09
	Np-239	mSv/a	4.01E-12	9.52E-14	0.00E+00	0.00E+00	1.95E-18	1.55E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-13	8.94E-13	7.39E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-08	1.79E-08	3.82E-08
	Pu-238	mSv/a	2.62E-05	6.33E-15	0.00E+00	0.00E+00	3.95E-12	4.45E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-08	1.56E-07	2.64E-05
	Pu-239	mSv/a	6.96E-05	1.54E-14	3.86E-09	2.03E-16	1.05E-11	4.92E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.45E-08	4.15E-07	7.01E-05
	Pu-240	mSv/a	9.93E-05	2.16E-14	1.26E-09	6.74E-17	1.50E-11	1.49E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	5.92E-07	1.00E-04
	Pu-241	mSv/a	4.11E-05	9.20E-15	0.00E+00	0.00E+00	6.53E-12	2.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-08	2.61E-07	4.14E-05
	Sr-90	mSv/a	2.55E-06	3.34E-10	4.66E-18	9.39E-23	5.92E-11	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-05	5.67E-05	1.09E-04
	Tc-99	mSv/a	1.19E-10	4.52E-15	5.31E-10	4.36E-14	2.30E-16	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.95E-10	1.12E-09	2.46E-09
	U-235	mSv/a	4.07E-10	2.70E-15	4.67E-13	2.39E-16	1.86E-16	2.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-11	4.52E-10	8.77E-10
	U-238	mSv/a	8.21E-09	2.25E-17	9.63E-12	2.87E-17	3.84E-15	4.09E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-10	9.31E-09	1.79E-08
	Total	**mSv/a**	**4.42E-04**	**9.46E-09**	**2.14E-07**	**3.08E-09**	**1.67E-10**	**8.23E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.46E-05**	**3.75E-04**	**9.11E-04**
Child-10y-Farm F	Ag-108m	mSv/a	3.87E-12	9.28E-14	7.78E-17	1.30E-17	6.58E-16	7.43E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-11	1.61E-10	2.65E-10
	Am-241	mSv/a	1.82E-04	1.03E-11	0.00E+00	0.00E+00	4.37E-10	1.39E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-07	1.22E-06	1.84E-04
	Am-243	mSv/a	1.65E-07	2.55E-14	2.06E-14	3.19E-18	3.96E-13	1.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-10	1.10E-09	1.66E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.23E-06	5.17E-16	0.00E+00	0.00E+00	2.76E-12	3.80E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-09	6.52E-09	1.24E-06
	Co-60	mSv/a	7.92E-10	2.10E-11	0.00E+00	0.00E+00	2.45E-13	1.54E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-10	1.32E-08	3.03E-08
	Cs-137	mSv/a	3.86E-07	8.94E-09	0.00E+00	0.00E+00	4.52E-10	7.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	2.18E-04	2.44E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	5.50E-08	1.62E-10	0.00E+00	0.00E+00	1.48E-12	1.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.77E-09	1.08E-08	1.99E-07
	Eu-155	mSv/a	9.59E-10	7.46E-13	0.00E+00	0.00E+00	2.98E-14	7.04E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-10	2.20E-10	2.00E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.53E-07	0.00E+00	1.04E-07	2.57E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-08	2.85E-07	6.43E-07
	I-129	mSv/a	1.03E-11	5.71E-17	1.05E-11	1.53E-16	6.29E-15	1.94E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.78E-11	8.93E-09	9.03E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	5.25E-09	7.09E-16	4.20E-12	3.96E-16	1.14E-14	6.58E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-11	3.47E-11	5.34E-09
	Np-239	mSv/a	5.74E-12	9.52E-14	0.00E+00	0.00E+00	5.69E-17	1.55E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-12	1.12E-12	9.67E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-08	2.02E-08	3.82E-08
	Pu-238	mSv/a	2.39E-05	6.33E-15	0.00E+00	0.00E+00	5.67E-11	4.45E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-08	1.55E-07	2.41E-05
	Pu-239	mSv/a	6.36E-05	1.54E-14	1.66E-09	2.03E-16	1.56E-10	4.92E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-08	4.27E-07	6.40E-05
	Pu-240	mSv/a	9.06E-05	2.16E-14	5.40E-10	6.74E-17	2.22E-10	1.49E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-08	6.09E-07	9.13E-05
	Pu-241	mSv/a	3.60E-05	9.20E-15	0.00E+00	0.00E+00	9.54E-11	2.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.67E-08	2.64E-07	3.64E-05
	Sr-90	mSv/a	3.43E-06	3.34E-10	3.97E-18	9.39E-23	1.74E-09	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-05	1.71E-04	2.43E-04
	Tc-99	mSv/a	1.61E-10	4.52E-15	4.29E-10	4.36E-14	6.41E-15	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-10	1.77E-09	3.28E-09
	U-235	mSv/a	5.38E-10	2.70E-15	2.81E-13	2.39E-16	3.87E-15	2.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-11	6.92E-10	1.25E-09
	U-238	mSv/a	1.08E-08	2.25E-17	5.79E-12	2.87E-17	7.98E-14	4.09E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-10	1.43E-08	2.54E-08
	Total	**mSv/a**	**4.02E-04**	**9.46E-09**	**1.06E-07**	**2.57E-09**	**3.17E-09**	**8.23E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.68E-05**	**3.92E-04**	**8.89E-04**
Infant_1y-Farm F	Ag-108m	mSv/a	3.07E-12	1.21E-13	0.00E+00	8.23E-18	1.87E-15	9.66E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-11	4.11E-10	5.37E-10
	Am-241	mSv/a	1.02E-04	1.34E-11	0.00E+00	0.00E+00	8.16E-10	1.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-07	7.26E-07	1.03E-04
	Am-243	mSv/a	9.07E-08	3.32E-14	0.00E+00	2.01E-18	7.39E-13	1.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-10	6.57E-10	9.16E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	8.40E-07	6.72E-16	0.00E+00	0.00E+00	6.34E-12	4.94E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-10	4.89E-09	8.46E-07
	Co-60	mSv/a	5.80E-10	2.74E-11	0.00E+00	0.00E+00	6.68E-13	2.00E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-10	1.50E-08	3.66E-08
	Cs-137	mSv/a	1.82E-07	1.16E-08	0.00E+00	0.00E+00	6.01E-10	9.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-06	2.12E-04	2.31E-04

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	4.11E-08	2.11E-10	0.00E+00	0.00E+00	4.82E-12	1.65E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-09	1.72E-08	2.30E-07
	Eu-155	mSv/a	7.75E-10	9.69E-13	0.00E+00	0.00E+00	1.07E-13	9.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-10	3.87E-10	2.23E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.06E-07	0.00E+00	0.00E+00	1.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.08E-08	5.88E-07	7.76E-07
	I-129	mSv/a	3.93E-12	7.43E-17	0.00E+00	9.63E-17	8.08E-15	2.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-11	9.60E-09	9.64E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	3.09E-09	9.21E-16	0.00E+00	2.50E-16	2.41E-14	8.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-11	2.72E-11	3.16E-09
	Np-239	mSv/a	5.57E-12	1.24E-13	0.00E+00	0.00E+00	2.12E-16	2.01E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-12	1.57E-12	1.09E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-08	2.94E-08	4.21E-08
	Pu-238	mSv/a	1.30E-05	8.23E-15	0.00E+00	0.00E+00	1.05E-10	5.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-08	1.37E-07	1.31E-05
	Pu-239	mSv/a	3.30E-05	2.01E-14	0.00E+00	1.28E-16	2.69E-10	6.40E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-08	3.52E-07	3.34E-05
	Pu-240	mSv/a	4.70E-05	2.81E-14	0.00E+00	4.25E-17	3.84E-10	1.93E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.44E-08	5.02E-07	4.76E-05
	Pu-241	mSv/a	1.36E-05	1.20E-14	0.00E+00	0.00E+00	1.18E-10	3.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-08	1.56E-07	1.38E-05
	Sr-90	mSv/a	2.39E-06	3.34E-10	0.00E+00	4.55E-23	2.35E-09	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-05	2.06E-04	2.43E-04
	Tc-99	mSv/a	1.19E-10	4.52E-15	0.00E+00	2.11E-14	2.63E-14	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-09	4.68E-09	6.19E-09
	U-235	mSv/a	4.04E-10	3.51E-15	0.00E+00	1.50E-16	7.86E-15	3.30E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-11	1.05E-09	1.47E-09
	U-238	mSv/a	8.18E-09	2.93E-17	0.00E+00	1.81E-17	1.56E-13	5.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-10	2.08E-08	2.93E-08
	Total	**mSv/a**	**2.12E-04**	**1.22E-08**	**0.00E+00**	**1.54E-09**	**4.66E-09**	**1.06E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.34E-05**	**4.20E-04**	**6.86E-04**
Infant_1y-Formula-Farm F	Ag-108m	mSv/a	3.07E-12	1.21E-13	1.30E-16	8.23E-18	1.87E-15	9.66E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-11	1.41E-11	1.40E-10
	Am-241	mSv/a	1.02E-04	1.34E-11	0.00E+00	0.00E+00	8.16E-10	1.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-07	7.07E-07	1.03E-04
	Am-243	mSv/a	9.07E-08	3.32E-14	2.27E-14	2.01E-18	7.39E-13	1.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-10	6.40E-10	9.16E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	8.40E-07	6.72E-16	0.00E+00	0.00E+00	6.34E-12	4.94E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-10	4.52E-09	8.46E-07
	Co-60	mSv/a	5.80E-10	2.74E-11	0.00E+00	0.00E+00	6.68E-13	2.00E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-10	1.01E-08	3.17E-08
	Cs-137	mSv/a	1.82E-07	1.16E-08	0.00E+00	0.00E+00	6.01E-10	9.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-06	3.34E-05	5.20E-05
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	4.11E-08	2.11E-10	0.00E+00	0.00E+00	4.82E-12	1.65E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-09	7.82E-09	2.21E-07
	Eu-155	mSv/a	7.75E-10	9.69E-13	0.00E+00	0.00E+00	1.07E-13	9.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-10	1.76E-10	2.02E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.06E-07	0.00E+00	1.44E-07	1.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.08E-08	2.60E-08	3.58E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	I-129	mSv/a	3.93E-12	7.43E-17	7.95E-12	9.63E-17	8.08E-15	2.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-11	5.92E-10	6.42E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	3.09E-09	9.21E-16	5.25E-12	2.50E-16	2.41E-14	8.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-11	2.09E-11	3.16E-09
	Np-239	mSv/a	5.57E-12	1.24E-13	0.00E+00	0.00E+00	2.12E-16	2.01E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-12	1.17E-12	1.05E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-08	7.23E-09	2.00E-08
	Pu-238	mSv/a	1.30E-05	8.23E-15	0.00E+00	0.00E+00	1.05E-10	5.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-08	6.84E-08	1.31E-05
	Pu-239	mSv/a	3.30E-05	2.01E-14	1.69E-09	1.28E-16	2.69E-10	6.40E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-08	1.75E-07	3.32E-05
	Pu-240	mSv/a	4.70E-05	2.81E-14	5.50E-10	4.25E-17	3.84E-10	1.93E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.44E-08	2.50E-07	4.73E-05
	Pu-241	mSv/a	1.36E-05	1.20E-14	0.00E+00	0.00E+00	1.18E-10	3.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-08	7.78E-08	1.37E-05
	Sr-90	mSv/a	2.39E-06	3.34E-10	3.17E-18	4.55E-23	2.35E-09	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-05	6.11E-06	4.35E-05
	Tc-99	mSv/a	1.19E-10	4.52E-15	1.04E-09	2.11E-14	2.63E-14	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-09	9.21E-10	3.47E-09
	U-235	mSv/a	4.04E-10	3.51E-15	3.37E-13	1.50E-16	7.86E-15	3.30E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-11	1.39E-10	5.58E-10
	U-238	mSv/a	8.18E-09	2.93E-17	6.69E-12	1.81E-17	1.56E-13	5.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-10	2.77E-09	1.12E-08
	Total	**mSv/a**	**2.12E-04**	**1.22E-08**	**1.47E-07**	**1.54E-09**	**4.66E-09**	**1.06E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.34E-05**	**4.09E-05**	**3.07E-04**

Table 4-14: Estimated Radiation Dose for Farm F 3-Month Old during Demolition Prior to Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant - Farm F	Ag-108m	mSv/a	4.91E-12	4.59E-13	6.62E-16	3.13E-17	4.43E-15	3.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-10
	Am-241	mSv/a	1.72E-04	5.09E-11	0.00E+00	0.00E+00	1.93E-08	6.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-04
	Am-243	mSv/a	1.54E-07	1.26E-13	1.12E-12	7.65E-18	1.70E-11	5.38E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.46E-06	2.56E-15	0.00E+00	0.00E+00	1.50E-10	1.88E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-06
	Co-60	mSv/a	1.15E-09	1.04E-10	0.00E+00	0.00E+00	3.16E-12	7.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.73E-08
	Cs-137	mSv/a	4.75E-07	4.41E-08	0.00E+00	0.00E+00	2.49E-09	3.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-05
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	7.01E-08	8.03E-10	0.00E+00	0.00E+00	2.38E-11	6.28E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.99E-07
	Eu-155	mSv/a	1.40E-09	3.69E-12	0.00E+00	0.00E+00	4.95E-13	3.48E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.92E-07	0.00E+00	8.37E-07	4.10E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-06
	I-129	mSv/a	5.35E-12	2.83E-16	3.30E-11	3.66E-16	1.57E-14	9.57E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	5.44E-09	3.51E-15	2.54E-10	9.51E-16	5.45E-13	3.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-09
	Np-239	mSv/a	1.25E-11	4.71E-13	0.00E+00	0.00E+00	7.83E-16	7.64E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	2.19E-05	3.13E-14	0.00E+00	0.00E+00	2.48E-09	2.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-05
	Pu-239	mSv/a	5.48E-05	7.64E-14	8.59E-08	4.87E-16	6.38E-09	2.43E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-05
	Pu-240	mSv/a	7.82E-05	1.07E-13	2.79E-08	1.62E-16	9.10E-09	7.36E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.82E-05
	Pu-241	mSv/a	2.04E-05	4.55E-14	0.00E+00	0.00E+00	2.75E-09	1.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-05
	Sr-90	mSv/a	5.22E-06	1.27E-09	5.07E-17	1.73E-22	1.76E-08	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-06
	Tc-99	mSv/a	2.48E-10	1.72E-14	1.10E-08	8.05E-14	1.30E-13	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-08
	U-235	mSv/a	8.41E-10	1.34E-14	4.61E-12	5.72E-16	5.01E-14	1.26E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-10
	U-238	mSv/a	1.67E-08	1.11E-16	9.64E-11	6.88E-17	1.05E-12	2.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-08
	Total	**mSv/a**	**3.55E-04**	**4.64E-08**	**9.62E-07**	**4.10E-09**	**6.03E-08**	**4.02E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.96E-04**
3mo.-Nursing Infant Formula - Farm F	Ag-108m	mSv/a	4.91E-12	4.59E-13	0.00E+00	3.13E-17	4.43E-15	3.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-11	4.00E-10
	Am-241	mSv/a	1.72E-04	5.09E-11	0.00E+00	0.00E+00	1.93E-08	6.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-07	1.73E-04
	Am-243	mSv/a	1.54E-07	1.26E-13	0.00E+00	7.65E-18	1.70E-11	5.38E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-10	1.54E-07
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	1.46E-06	2.56E-15	0.00E+00	0.00E+00	1.50E-10	1.88E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-09	1.46E-06
	Co-60	mSv/a	1.15E-09	1.04E-10	0.00E+00	0.00E+00	3.16E-12	7.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08	9.71E-08
	Cs-137	mSv/a	4.75E-07	4.41E-08	0.00E+00	0.00E+00	2.49E-09	3.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-04	4.12E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	7.01E-08	8.03E-10	0.00E+00	0.00E+00	2.38E-11	6.28E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-08	7.11E-07
	Eu-155	mSv/a	1.40E-09	3.69E-12	0.00E+00	0.00E+00	4.95E-13	3.48E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-10	5.15E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	1.92E-07	0.00E+00	0.00E+00	4.10E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E-06	3.06E-06
	I-129	mSv/a	5.35E-12	2.83E-16	0.00E+00	3.66E-16	1.57E-14	9.57E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.49E-09	9.49E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	5.44E-09	3.51E-15	0.00E+00	9.51E-16	5.45E-13	3.25E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-11	5.48E-09
	Np-239	mSv/a	1.25E-11	4.71E-13	0.00E+00	0.00E+00	7.83E-16	7.64E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.12E-13	2.15E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.19E-08	9.19E-08
	Pu-238	mSv/a	2.19E-05	3.13E-14	0.00E+00	0.00E+00	2.48E-09	2.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-08	2.19E-05
	Pu-239	mSv/a	5.48E-05	7.64E-14	0.00E+00	4.87E-16	6.38E-09	2.43E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-08	5.49E-05
	Pu-240	mSv/a	7.82E-05	1.07E-13	0.00E+00	1.62E-16	9.10E-09	7.36E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-07	7.83E-05
	Pu-241	mSv/a	2.04E-05	4.55E-14	0.00E+00	0.00E+00	2.75E-09	1.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-08	2.06E-05
	Sr-90	mSv/a	5.22E-06	1.27E-09	0.00E+00	1.73E-22	1.76E-08	2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-04	4.63E-04
	Tc-99	mSv/a	2.48E-10	1.72E-14	0.00E+00	8.05E-14	1.30E-13	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-09	3.52E-09
	U-235	mSv/a	8.41E-10	1.34E-14	0.00E+00	5.72E-16	5.01E-14	1.26E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-11	8.71E-10
	U-238	mSv/a	1.67E-08	1.11E-16	0.00E+00	6.88E-17	1.05E-12	2.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-10	1.73E-08
	Total	**mSv/a**	**3.55E-04**	**4.64E-08**	**0.00E+00**	**4.10E-09**	**6.03E-08**	**4.02E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.34E-04**	**1.23E-03**

Table 4-15: Estimated Radiation Dose for Farm 3-Month Old during Demolition Prior to Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant - Farm F	Ag-108m	mSv/a	1.29E-12	1.21E-13	1.74E-16	8.23E-18	1.16E-15	9.66E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.81E-11
	Am-241	mSv/a	4.53E-05	1.34E-11	0.00E+00	0.00E+00	5.08E-09	1.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.53E-05
	Am-243	mSv/a	4.04E-08	3.32E-14	2.95E-13	2.01E-18	4.48E-12	1.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	3.84E-07	6.72E-16	0.00E+00	0.00E+00	3.95E-11	4.94E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-07
	Co-60	mSv/a	3.02E-10	2.74E-11	0.00E+00	0.00E+00	8.32E-13	2.00E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-08
	Cs-137	mSv/a	1.25E-07	1.16E-08	0.00E+00	0.00E+00	6.55E-10	9.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.84E-08	2.11E-10	0.00E+00	0.00E+00	6.25E-12	1.65E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-07
	Eu-155	mSv/a	3.69E-10	9.69E-13	0.00E+00	0.00E+00	1.30E-13	9.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	5.83E-08	0.00E+00	2.54E-07	1.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-07
	I-129	mSv/a	1.41E-12	7.43E-17	8.68E-12	9.63E-17	4.12E-15	2.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.43E-09	9.21E-16	6.67E-11	2.50E-16	1.43E-13	8.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-09
	Np-239	mSv/a	3.29E-12	1.24E-13	0.00E+00	0.00E+00	2.06E-16	2.01E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.43E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	5.76E-06	8.23E-15	0.00E+00	0.00E+00	6.53E-10	5.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.76E-06
	Pu-239	mSv/a	1.44E-05	2.01E-14	2.26E-08	1.28E-16	1.68E-09	6.40E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-05
	Pu-240	mSv/a	2.06E-05	2.81E-14	7.34E-09	4.25E-17	2.39E-09	1.93E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-05
	Pu-241	mSv/a	5.37E-06	1.20E-14	0.00E+00	0.00E+00	7.24E-10	3.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.41E-06
	Sr-90	mSv/a	1.37E-06	3.34E-10	1.33E-17	4.55E-23	4.62E-09	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-06
	Tc-99	mSv/a	6.53E-11	4.52E-15	2.89E-09	2.11E-14	3.41E-14	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-09
	U-235	mSv/a	2.21E-10	3.51E-15	1.21E-12	1.50E-16	1.32E-14	3.30E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-10
	U-238	mSv/a	4.39E-09	2.93E-17	2.53E-11	1.81E-17	2.76E-13	5.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-09
	Total	**mSv/a**	**9.34E-05**	**1.22E-08**	**2.87E-07**	**1.24E-09**	**1.59E-08**	**1.06E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.04E-04**
3mo.-Nursing Infant Formula - Farm F	Ag-108m	mSv/a	1.29E-12	1.21E-13	0.00E+00	8.23E-18	1.16E-15	9.66E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.12E-12	1.05E-10
	Am-241	mSv/a	4.53E-05	1.34E-11	0.00E+00	0.00E+00	5.08E-09	1.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.51E-08	4.53E-05
	Am-243	mSv/a	4.04E-08	3.32E-14	0.00E+00	2.01E-18	4.48E-12	1.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-11	4.06E-08
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cm-244	mSv/a	3.84E-07	6.72E-16	0.00E+00	0.00E+00	3.95E-11	4.94E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-10	3.85E-07
	Co-60	mSv/a	3.02E-10	2.74E-11	0.00E+00	0.00E+00	8.32E-13	2.00E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-09	2.55E-08
	Cs-137	mSv/a	1.25E-07	1.16E-08	0.00E+00	0.00E+00	6.55E-10	9.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.83E-05	1.08E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	1.84E-08	2.11E-10	0.00E+00	0.00E+00	6.25E-12	1.65E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-09	1.87E-07
	Eu-155	mSv/a	3.69E-10	9.69E-13	0.00E+00	0.00E+00	1.30E-13	9.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-11	1.35E-09
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HTO	mSv/a	5.83E-08	0.00E+00	0.00E+00	1.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.68E-07	9.27E-07
	I-129	mSv/a	1.41E-12	7.43E-17	0.00E+00	9.63E-17	4.12E-15	2.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-09	2.50E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	1.43E-09	9.21E-16	0.00E+00	2.50E-16	1.43E-13	8.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-12	1.44E-09
	Np-239	mSv/a	3.29E-12	1.24E-13	0.00E+00	0.00E+00	2.06E-16	2.01E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-13	5.64E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-08	2.79E-08
	Pu-238	mSv/a	5.76E-06	8.23E-15	0.00E+00	0.00E+00	6.53E-10	5.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-09	5.77E-06
	Pu-239	mSv/a	1.44E-05	2.01E-14	0.00E+00	1.28E-16	1.68E-09	6.40E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08	1.44E-05
	Pu-240	mSv/a	2.06E-05	2.81E-14	0.00E+00	4.25E-17	2.39E-09	1.93E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-08	2.06E-05
	Pu-241	mSv/a	5.37E-06	1.20E-14	0.00E+00	0.00E+00	7.24E-10	3.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.64E-09	5.42E-06
	Sr-90	mSv/a	1.37E-06	3.34E-10	0.00E+00	4.55E-23	4.62E-09	5.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-04	1.22E-04
	Tc-99	mSv/a	6.53E-11	4.52E-15	0.00E+00	2.11E-14	3.41E-14	5.31E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.61E-10	9.26E-10
	U-235	mSv/a	2.21E-10	3.51E-15	0.00E+00	1.50E-16	1.32E-14	3.30E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-12	2.29E-10
	U-238	mSv/a	4.39E-09	2.93E-17	0.00E+00	1.81E-17	2.76E-13	5.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E-11	4.53E-09
	Total	**mSv/a**	**9.34E-05**	**1.22E-08**	**0.00E+00**	**1.24E-09**	**1.59E-08**	**1.06E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.19E-04**	**3.23E-04**

Table 4-16: Estimated Radiation Dose for On-Site Receptor during Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult On-Site (Worker)	Ag-108m	mSv/a	1.63E-13	5.54E-15	0.00E+00	0.00E+00	2.17E-18	6.31E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-12
	Am-241	mSv/a	2.24E-06	1.14E-13	0.00E+00	0.00E+00	4.58E-13	2.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-06
	Am-243	mSv/a	1.97E-09	2.82E-16	0.00E+00	0.00E+00	4.12E-16	1.71E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-09
	C-14	mSv/a	1.09E-10	1.25E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-10
	Ca-41	mSv/a	4.03E-14	0.00E+00	0.00E+00	0.00E+00	3.43E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-14
	Cl-36	mSv/a	9.30E-17	1.12E-20	0.00E+00	0.00E+00	2.54E-21	7.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-16
	Cm-244	mSv/a	1.41E-08	5.64E-18	0.00E+00	0.00E+00	2.65E-15	5.85E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-08
	Co-60	mSv/a	4.21E-06	1.60E-07	0.00E+00	0.00E+00	5.77E-11	1.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-04
	Cs-137	mSv/a	5.52E-09	9.80E-11	0.00E+00	0.00E+00	6.62E-13	1.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-07
	Eu-152	mSv/a	9.12E-11	3.66E-13	0.00E+00	0.00E+00	1.27E-16	4.05E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-10
	Eu-154	mSv/a	5.10E-10	1.76E-12	0.00E+00	0.00E+00	7.94E-16	1.92E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-09
	Eu-155	mSv/a	8.11E-12	8.00E-15	0.00E+00	0.00E+00	1.50E-17	1.04E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-11
	Fe-55	mSv/a	2.04E-08	0.00E+00	0.00E+00	0.00E+00	6.72E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-08
	HTO	mSv/a	5.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-06
	I-129	mSv/a	6.78E-14	6.32E-19	0.00E+00	0.00E+00	5.63E-18	4.11E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.19E-14
	Nb-94	mSv/a	1.00E-07	2.08E-09	0.00E+00	0.00E+00	6.64E-13	2.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-06
	Ni-59	mSv/a	3.27E-09	0.00E+00	0.00E+00	0.00E+00	6.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-09
	Ni-63	mSv/a	1.39E-06	0.00E+00	0.00E+00	0.00E+00	1.87E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-06
	Np-237	mSv/a	6.38E-11	7.84E-18	0.00E+00	0.00E+00	1.30E-17	1.03E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.39E-11
	Np-239	mSv/a	4.46E-14	1.06E-15	0.00E+00	0.00E+00	1.54E-20	1.22E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	2.89E-07	6.97E-17	0.00E+00	0.00E+00	6.19E-14	6.96E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.89E-07
	Pu-239	mSv/a	7.69E-07	1.71E-16	0.00E+00	0.00E+00	1.65E-13	7.74E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-07
	Pu-240	mSv/a	1.10E-06	2.39E-16	0.00E+00	0.00E+00	2.36E-13	2.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-06
	Pu-241	mSv/a	4.48E-07	1.00E-16	0.00E+00	0.00E+00	1.00E-13	3.71E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-07
	Sr-90	mSv/a	2.79E-08	3.67E-12	0.00E+00	0.00E+00	9.14E-13	8.34E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-08
	Tc-99	mSv/a	1.31E-12	4.99E-17	0.00E+00	0.00E+00	2.00E-18	4.64E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-12
	U-235	mSv/a	4.50E-12	2.99E-17	0.00E+00	0.00E+00	2.93E-18	4.00E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-12
	U-238	mSv/a	9.07E-11	2.49E-19	0.00E+00	0.00E+00	6.04E-17	6.43E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.14E-11
	Total	**mSv/a**	**1.59E-05**	**1.62E-07**	**0.00E+00**	**0.00E+00**	**8.04E-11**	**1.64E-04**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.80E-04**

Table 4-17: Estimated Radiation Dose for On-Site Receptor during Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult On-Site (Worker)	Ag-108m	mSv/a	8.66E-14	2.94E-15	0.00E+00	0.00E+00	1.15E-18	3.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-12
	Am-241	mSv/a	1.19E-06	6.06E-14	0.00E+00	0.00E+00	2.43E-13	1.16E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-06
	Am-243	mSv/a	1.04E-09	1.50E-16	0.00E+00	0.00E+00	2.18E-16	9.07E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-09
	C-14	mSv/a	5.77E-11	6.64E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.78E-11
	Ca-41	mSv/a	2.14E-14	0.00E+00	0.00E+00	0.00E+00	1.82E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-14
	Cl-36	mSv/a	4.93E-17	5.94E-21	0.00E+00	0.00E+00	1.34E-21	3.71E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.64E-17
	Cm-244	mSv/a	7.48E-09	2.99E-18	0.00E+00	0.00E+00	1.40E-15	3.10E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.48E-09
	Co-60	mSv/a	2.23E-06	8.47E-08	0.00E+00	0.00E+00	3.06E-11	8.53E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-05
	Cs-137	mSv/a	2.93E-09	5.19E-11	0.00E+00	0.00E+00	3.51E-13	6.17E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.47E-08
	Eu-152	mSv/a	4.84E-11	1.94E-13	0.00E+00	0.00E+00	6.75E-17	2.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-10
	Eu-154	mSv/a	2.70E-10	9.31E-13	0.00E+00	0.00E+00	4.21E-16	1.01E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-09
	Eu-155	mSv/a	4.30E-12	4.24E-15	0.00E+00	0.00E+00	7.96E-18	5.49E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.79E-12
	Fe-55	mSv/a	1.08E-08	0.00E+00	0.00E+00	0.00E+00	3.56E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-08
	HTO	mSv/a	5.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-06
	I-129	mSv/a	3.59E-14	3.35E-19	0.00E+00	0.00E+00	2.98E-18	2.18E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-14
	Nb-94	mSv/a	5.30E-08	1.10E-09	0.00E+00	0.00E+00	3.52E-13	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-06
	Ni-59	mSv/a	1.73E-09	0.00E+00	0.00E+00	0.00E+00	3.61E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-09
	Ni-63	mSv/a	7.39E-07	0.00E+00	0.00E+00	0.00E+00	9.89E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.39E-07
	Np-237	mSv/a	3.38E-11	4.15E-18	0.00E+00	0.00E+00	6.87E-18	5.45E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-11
	Np-239	mSv/a	2.36E-14	5.61E-16	0.00E+00	0.00E+00	8.17E-21	6.49E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	1.53E-07	3.70E-17	0.00E+00	0.00E+00	3.28E-14	3.69E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-07
	Pu-239	mSv/a	4.08E-07	9.05E-17	0.00E+00	0.00E+00	8.76E-14	4.10E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-07
	Pu-240	mSv/a	5.82E-07	1.27E-16	0.00E+00	0.00E+00	1.25E-13	1.24E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-07
	Pu-241	mSv/a	2.37E-07	5.32E-17	0.00E+00	0.00E+00	5.31E-14	1.96E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-07
	Sr-90	mSv/a	1.48E-08	1.94E-12	0.00E+00	0.00E+00	4.84E-13	4.42E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-08
	Tc-99	mSv/a	6.95E-13	2.65E-17	0.00E+00	0.00E+00	1.06E-18	2.46E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.95E-13
	U-235	mSv/a	2.39E-12	1.58E-17	0.00E+00	0.00E+00	1.55E-18	2.12E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-12
	U-238	mSv/a	4.81E-11	1.32E-19	0.00E+00	0.00E+00	3.20E-17	3.41E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-11
	Total	**mSv/a**	**1.09E-05**	**8.58E-08**	**0.00E+00**	**0.00E+00**	**4.26E-11**	**8.67E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**9.76E-05**

Table 4-18: Estimated Radiation Dose for Harvester during Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ag-108m	mSv/a	1.71E-15	9.65E-17	0.00E+00	0.00E+00	9.31E-19	2.32E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-13	1.27E-14	5.47E-13
	Am-241	mSv/a	2.34E-08	1.99E-15	0.00E+00	0.00E+00	1.96E-13	8.08E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-10	1.95E-10	2.44E-08
	Am-243	mSv/a	2.05E-11	4.91E-18	0.00E+00	0.00E+00	1.76E-16	6.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.41E-13	1.75E-13	2.15E-11
	C-14	mSv/a	1.14E-12	1.31E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.93E-09	4.11E-09	9.04E-09
	Ca-41	mSv/a	4.21E-16	0.00E+00	0.00E+00	0.00E+00	1.47E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.01E-13	2.32E-13	7.34E-13
	Cl-36	mSv/a	9.71E-19	1.17E-22	0.00E+00	0.00E+00	9.00E-22	3.83E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-15	2.42E-15	4.67E-15
	Cm-244	mSv/a	1.47E-10	9.82E-20	0.00E+00	0.00E+00	1.13E-15	2.15E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-12	6.96E-13	1.53E-10
	Co-60	mSv/a	4.40E-08	2.78E-09	0.00E+00	0.00E+00	2.47E-11	5.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E-07	1.31E-06	8.16E-06
	Cs-137	mSv/a	5.77E-11	1.70E-12	0.00E+00	0.00E+00	2.84E-13	4.28E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.26E-08	2.51E-06	2.61E-06
	Eu-152	mSv/a	9.53E-13	6.37E-15	0.00E+00	0.00E+00	5.45E-17	1.49E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-12	4.13E-12	2.18E-11
	Eu-154	mSv/a	5.33E-12	3.06E-14	0.00E+00	0.00E+00	3.40E-16	7.04E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-11	2.61E-11	1.14E-10
	Eu-155	mSv/a	8.46E-14	1.39E-16	0.00E+00	0.00E+00	6.43E-18	3.81E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-13	5.08E-13	1.20E-12
	Fe-55	mSv/a	2.13E-10	0.00E+00	0.00E+00	0.00E+00	2.88E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-08	3.58E-08	4.67E-08
	HTO	mSv/a	5.49E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.14E-07	1.07E-07	8.76E-07
	I-129	mSv/a	7.08E-16	1.10E-20	0.00E+00	0.00E+00	1.91E-18	1.20E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-13	7.77E-13	9.74E-13
	Nb-94	mSv/a	1.04E-09	3.62E-11	0.00E+00	0.00E+00	2.84E-13	8.82E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.56E-09	3.50E-10	9.92E-08
	Ni-59	mSv/a	3.42E-11	0.00E+00	0.00E+00	0.00E+00	2.92E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.65E-09	3.26E-09	1.29E-08
	Ni-63	mSv/a	1.46E-08	0.00E+00	0.00E+00	0.00E+00	7.99E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-06	8.94E-07	3.56E-06
	Np-237	mSv/a	6.66E-13	1.36E-19	0.00E+00	0.00E+00	5.55E-18	3.78E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-13	1.52E-14	8.72E-13
	Np-239	mSv/a	4.65E-16	1.84E-17	0.00E+00	0.00E+00	6.60E-21	4.49E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-15	3.07E-16	3.54E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	1.17E-08	1.32E-07
	Pu-238	mSv/a	3.02E-09	1.21E-18	0.00E+00	0.00E+00	2.65E-14	2.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-10	2.85E-11	3.16E-09
	Pu-239	mSv/a	8.03E-09	2.97E-18	0.00E+00	0.00E+00	7.08E-14	2.84E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-10	7.59E-11	8.41E-09
	Pu-240	mSv/a	1.15E-08	4.16E-18	0.00E+00	0.00E+00	1.01E-13	8.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-10	1.08E-10	1.20E-08
	Pu-241	mSv/a	4.68E-09	1.75E-18	0.00E+00	0.00E+00	4.29E-14	1.36E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-10	4.71E-11	4.92E-09
	Sr-90	mSv/a	2.92E-10	3.83E-14	0.00E+00	0.00E+00	3.91E-13	5.52E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-07	6.23E-08	1.98E-07
	Tc-99	mSv/a	1.37E-14	5.21E-19	0.00E+00	0.00E+00	8.58E-19	3.07E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-12	6.08E-14	1.38E-12
	U-235	mSv/a	4.70E-14	5.20E-19	0.00E+00	0.00E+00	1.25E-18	1.47E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E-14	2.85E-12	2.94E-12
	U-238	mSv/a	9.47E-13	4.33E-21	0.00E+00	0.00E+00	2.59E-17	2.36E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.62E-13	5.87E-11	6.06E-11
	Total	**mSv/a**	**1.66E-07**	**2.82E-09**	**0.00E+00**	**0.00E+00**	**3.44E-11**	**6.01E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.63E-06**	**4.94E-06**	**1.58E-05**
Child-10y-Harvester	Ag-108m	mSv/a	2.41E-15	9.65E-17	0.00E+00	0.00E+00	2.39E-17	2.32E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-13	1.06E-14	6.68E-13
	Am-241	mSv/a	2.12E-08	1.99E-15	0.00E+00	0.00E+00	2.96E-12	8.08E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-10	9.58E-11	2.20E-08
	Am-243	mSv/a	1.90E-11	4.91E-18	0.00E+00	0.00E+00	2.67E-15	6.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-13	8.62E-14	1.98E-11
	C-14	mSv/a	1.62E-12	1.31E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-09	2.54E-09	7.66E-09

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	7.17E-16	0.00E+00	0.00E+00	0.00E+00	5.11E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.53E-13	2.62E-13	1.22E-12
	Cl-36	mSv/a	1.27E-18	1.17E-22	0.00E+00	0.00E+00	2.53E-20	3.83E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-15	2.21E-15	5.67E-15
	Cm-244	mSv/a	1.40E-10	9.82E-20	0.00E+00	0.00E+00	1.82E-14	2.15E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-12	3.63E-13	1.45E-10
	Co-60	mSv/a	6.28E-08	2.78E-09	0.00E+00	0.00E+00	1.10E-09	5.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-06	1.90E-06	1.00E-05
	Cs-137	mSv/a	4.41E-11	1.70E-12	0.00E+00	0.00E+00	3.00E-12	4.28E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-08	8.64E-07	9.22E-07
	Eu-152	mSv/a	1.06E-12	6.37E-15	0.00E+00	0.00E+00	1.39E-15	1.49E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-12	3.43E-12	2.20E-11
	Eu-154	mSv/a	6.22E-12	3.06E-14	0.00E+00	0.00E+00	9.59E-15	7.04E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-11	2.39E-11	1.19E-10
	Eu-155	mSv/a	1.07E-13	1.39E-16	0.00E+00	0.00E+00	1.88E-16	3.81E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-13	4.83E-13	1.34E-12
	Fe-55	mSv/a	3.30E-10	0.00E+00	0.00E+00	0.00E+00	1.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-08	5.35E-08	8.04E-08
	HTO	mSv/a	6.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E-07	6.00E-08	7.96E-07
	I-129	mSv/a	1.19E-15	1.10E-20	0.00E+00	0.00E+00	4.53E-17	1.20E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-13	6.00E-13	8.58E-13
	Nb-94	mSv/a	1.45E-09	3.62E-11	0.00E+00	0.00E+00	7.82E-12	8.82E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-08	3.13E-10	1.04E-07
	Ni-59	mSv/a	5.25E-11	0.00E+00	0.00E+00	0.00E+00	7.00E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-08	2.54E-09	1.53E-08
	Ni-63	mSv/a	2.02E-08	0.00E+00	0.00E+00	0.00E+00	2.05E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-06	7.47E-07	4.49E-06
	Np-237	mSv/a	6.06E-13	1.36E-19	0.00E+00	0.00E+00	7.63E-17	3.78E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-13	6.80E-15	7.57E-13
	Np-239	mSv/a	6.66E-16	1.84E-17	0.00E+00	0.00E+00	1.93E-19	4.49E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-15	2.92E-16	5.10E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-07	7.18E-09	1.31E-07
	Pu-238	mSv/a	2.75E-09	1.21E-18	0.00E+00	0.00E+00	3.80E-13	2.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-11	1.33E-11	2.85E-09
	Pu-239	mSv/a	7.34E-09	2.97E-18	0.00E+00	0.00E+00	1.05E-12	2.84E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-10	3.67E-11	7.62E-09
	Pu-240	mSv/a	1.05E-08	4.16E-18	0.00E+00	0.00E+00	1.50E-12	8.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-10	5.23E-11	1.09E-08
	Pu-241	mSv/a	4.10E-09	1.75E-18	0.00E+00	0.00E+00	6.27E-13	1.36E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-10	2.24E-11	4.28E-09
	Sr-90	mSv/a	3.93E-10	3.83E-14	0.00E+00	0.00E+00	1.15E-11	5.52E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-07	5.98E-08	2.78E-07
	Tc-99	mSv/a	1.86E-14	5.21E-19	0.00E+00	0.00E+00	2.40E-17	3.07E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-12	5.52E-14	2.06E-12
	U-235	mSv/a	6.21E-14	5.20E-19	0.00E+00	0.00E+00	2.61E-17	1.47E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-14	1.93E-12	2.04E-12
	U-238	mSv/a	1.24E-12	4.33E-21	0.00E+00	0.00E+00	5.37E-16	2.36E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.80E-13	3.97E-11	4.20E-11
	Total	**mSv/a**	**1.97E-07**	**2.82E-09**	**0.00E+00**	**0.00E+00**	**1.35E-09**	**6.01E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**7.00E-06**	**3.69E-06**	**1.69E-05**
Infant_1y-Havester	Ag-108m	mSv/a	1.91E-15	1.25E-16	0.00E+00	0.00E+00	6.79E-17	3.01E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-13	8.33E-15	7.85E-13
	Am-241	mSv/a	1.18E-08	2.59E-15	0.00E+00	0.00E+00	5.53E-12	1.05E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.01E-10	4.90E-11	1.24E-08
	Am-243	mSv/a	1.05E-11	6.38E-18	0.00E+00	0.00E+00	4.98E-15	8.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-13	4.41E-14	1.10E-11
	C-14	mSv/a	1.11E-12	1.31E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-09	1.50E-09	5.97E-09
	Ca-41	mSv/a	3.54E-16	0.00E+00	0.00E+00	0.00E+00	6.14E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-13	9.21E-14	5.43E-13
	Cl-36	mSv/a	1.06E-18	1.17E-22	0.00E+00	0.00E+00	9.30E-20	3.83E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-15	2.25E-15	7.24E-15
	Cm-244	mSv/a	9.57E-11	1.28E-19	0.00E+00	0.00E+00	4.17E-14	2.79E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.83E-12	2.29E-13	9.98E-11
	Co-60	mSv/a	4.60E-08	3.61E-09	0.00E+00	0.00E+00	2.99E-09	7.69E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-06	1.41E-06	1.15E-05
	Cs-137	mSv/a	2.08E-11	2.21E-12	0.00E+00	0.00E+00	3.99E-12	5.58E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-08	2.21E-07	2.54E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	6.98E-13	8.28E-15	0.00E+00	0.00E+00	4.39E-15	1.94E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-12	2.97E-12	2.63E-11
	Eu-154	mSv/a	4.64E-12	3.98E-14	0.00E+00	0.00E+00	3.11E-14	9.15E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-11	2.13E-11	1.41E-10
	Eu-155	mSv/a	8.68E-14	1.81E-16	0.00E+00	0.00E+00	6.74E-16	4.95E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-13	4.76E-13	1.58E-12
	Fe-55	mSv/a	2.41E-10	0.00E+00	0.00E+00	0.00E+00	3.19E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-08	3.55E-08	6.11E-08
	HTO	mSv/a	4.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-07	3.80E-08	7.04E-07
	I-129	mSv/a	4.54E-16	1.43E-20	0.00E+00	0.00E+00	5.82E-17	1.56E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-13	2.11E-13	3.41E-13
	Nb-94	mSv/a	1.08E-09	4.71E-11	0.00E+00	0.00E+00	2.48E-11	1.15E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-08	2.72E-10	1.34E-07
	Ni-59	mSv/a	5.01E-11	0.00E+00	0.00E+00	0.00E+00	2.40E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-08	2.40E-09	1.96E-08
	Ni-63	mSv/a	1.77E-08	0.00E+00	0.00E+00	0.00E+00	6.82E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-06	6.85E-07	5.58E-06
	Np-237	mSv/a	3.56E-13	1.77E-19	0.00E+00	0.00E+00	1.62E-16	4.91E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-13	3.95E-15	4.83E-13
	Np-239	mSv/a	6.46E-16	2.39E-17	0.00E+00	0.00E+00	7.17E-19	5.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.38E-15	2.98E-16	6.94E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-07	4.42E-09	1.16E-07
	Pu-238	mSv/a	1.49E-09	1.58E-18	0.00E+00	0.00E+00	7.03E-13	3.33E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.37E-11	6.76E-12	1.57E-09
	Pu-239	mSv/a	3.81E-09	3.86E-18	0.00E+00	0.00E+00	1.81E-12	3.70E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-10	1.74E-11	3.99E-09
	Pu-240	mSv/a	5.43E-09	5.41E-18	0.00E+00	0.00E+00	2.59E-12	1.12E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-10	2.48E-11	5.69E-09
	Pu-241	mSv/a	1.55E-09	2.27E-18	0.00E+00	0.00E+00	7.77E-13	1.77E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.16E-11	7.61E-12	1.65E-09
	Sr-90	mSv/a	2.74E-10	3.83E-14	0.00E+00	0.00E+00	1.56E-11	5.52E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-07	2.36E-08	1.40E-07
	Tc-99	mSv/a	1.37E-14	5.21E-19	0.00E+00	0.00E+00	9.82E-17	3.07E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-12	6.23E-14	3.28E-12
	U-235	mSv/a	4.67E-14	6.76E-19	0.00E+00	0.00E+00	5.29E-17	1.91E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-14	1.19E-12	1.27E-12
	U-238	mSv/a	9.44E-13	5.63E-21	0.00E+00	0.00E+00	1.05E-15	3.07E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-13	2.36E-11	2.53E-11
	Total	**mSv/a**	**1.35E-07**	**3.66E-09**	**0.00E+00**	**0.00E+00**	**3.76E-09**	**7.81E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.13E-06**	**2.42E-06**	**1.85E-05**

Table 4-19: Estimated Radiation Dose for Harvester during Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ag-108m	mSv/a	9.04E-16	5.11E-17	0.00E+00	0.00E+00	4.93E-19	1.23E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-13	6.74E-15	2.90E-13
	Am-241	mSv/a	1.24E-08	1.06E-15	0.00E+00	0.00E+00	1.04E-13	4.28E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-10	1.03E-10	1.29E-08
	Am-243	mSv/a	1.09E-11	2.60E-18	0.00E+00	0.00E+00	9.35E-17	3.33E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-13	9.28E-14	1.14E-11
	C-14	mSv/a	6.03E-13	6.93E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-09	2.18E-09	4.79E-09
	Ca-41	mSv/a	2.23E-16	0.00E+00	0.00E+00	0.00E+00	7.79E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-13	1.23E-13	3.89E-13
	Cl-36	mSv/a	5.15E-19	6.20E-23	0.00E+00	0.00E+00	4.77E-22	2.03E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-15	1.28E-15	2.47E-15
	Cm-244	mSv/a	7.81E-11	5.20E-20	0.00E+00	0.00E+00	6.00E-16	1.14E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-12	3.69E-13	8.10E-11
	Co-60	mSv/a	2.33E-08	1.47E-09	0.00E+00	0.00E+00	1.31E-11	3.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-07	6.94E-07	4.32E-06
	Cs-137	mSv/a	3.06E-11	9.03E-13	0.00E+00	0.00E+00	1.50E-13	2.27E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.91E-08	1.33E-06	1.38E-06
	Eu-152	mSv/a	5.05E-13	3.37E-15	0.00E+00	0.00E+00	2.89E-17	7.89E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-13	2.19E-12	1.16E-11
	Eu-154	mSv/a	2.82E-12	1.62E-14	0.00E+00	0.00E+00	1.80E-16	3.73E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E-12	1.38E-11	6.02E-11
	Eu-155	mSv/a	4.48E-14	7.37E-17	0.00E+00	0.00E+00	3.41E-18	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-13	2.69E-13	6.37E-13
	Fe-55	mSv/a	1.13E-10	0.00E+00	0.00E+00	0.00E+00	1.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.63E-09	1.90E-08	2.47E-08
	HTO	mSv/a	5.49E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.14E-07	1.07E-07	8.76E-07
	I-129	mSv/a	3.75E-16	5.83E-21	0.00E+00	0.00E+00	1.01E-18	6.34E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-13	4.12E-13	5.16E-13
	Nb-94	mSv/a	5.53E-10	1.92E-11	0.00E+00	0.00E+00	1.51E-13	4.67E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-09	1.85E-10	5.26E-08
	Ni-59	mSv/a	1.81E-11	0.00E+00	0.00E+00	0.00E+00	1.55E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E-09	1.73E-09	6.86E-09
	Ni-63	mSv/a	7.71E-09	0.00E+00	0.00E+00	0.00E+00	4.23E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-06	4.74E-07	1.89E-06
	Np-237	mSv/a	3.53E-13	7.23E-20	0.00E+00	0.00E+00	2.94E-18	2.00E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.89E-14	8.05E-15	4.62E-13
	Np-239	mSv/a	2.46E-16	9.75E-18	0.00E+00	0.00E+00	3.50E-21	2.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-15	1.63E-16	1.88E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	1.17E-08	1.32E-07
	Pu-238	mSv/a	1.60E-09	6.43E-19	0.00E+00	0.00E+00	1.40E-14	1.36E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-11	1.51E-11	1.67E-09
	Pu-239	mSv/a	4.26E-09	1.57E-18	0.00E+00	0.00E+00	3.75E-14	1.51E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-10	4.02E-11	4.45E-09
	Pu-240	mSv/a	6.07E-09	2.20E-18	0.00E+00	0.00E+00	5.35E-14	4.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-10	5.74E-11	6.35E-09
	Pu-241	mSv/a	2.48E-09	9.25E-19	0.00E+00	0.00E+00	2.27E-14	7.22E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-11	2.49E-11	2.61E-09
	Sr-90	mSv/a	1.55E-10	2.03E-14	0.00E+00	0.00E+00	2.07E-13	2.92E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.14E-08	3.30E-08	1.05E-07
	Tc-99	mSv/a	7.26E-15	2.76E-19	0.00E+00	0.00E+00	4.55E-19	1.63E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-13	3.22E-14	7.29E-13
	U-235	mSv/a	2.49E-14	2.76E-19	0.00E+00	0.00E+00	6.65E-19	7.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-14	1.51E-12	1.56E-12
	U-238	mSv/a	5.02E-13	2.30E-21	0.00E+00	0.00E+00	1.37E-17	1.25E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-13	3.11E-11	3.21E-11
	Total	**mSv/a**	**1.14E-07**	**1.49E-09**	**0.00E+00**	**0.00E+00**	**1.82E-11**	**3.18E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.85E-06**	**2.67E-06**	**8.82E-06**
Child-10y-Harvester	Ag-108m	mSv/a	1.28E-15	5.11E-17	0.00E+00	0.00E+00	1.27E-17	1.23E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-13	5.64E-15	3.54E-13
	Am-241	mSv/a	1.12E-08	1.06E-15	0.00E+00	0.00E+00	1.57E-12	4.28E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.61E-10	5.08E-11	1.16E-08
	Am-243	mSv/a	1.01E-11	2.60E-18	0.00E+00	0.00E+00	1.41E-15	3.33E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-13	4.57E-14	1.05E-11
	C-14	mSv/a	8.60E-13	6.93E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-09	1.34E-09	4.06E-09

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	3.80E-16	0.00E+00	0.00E+00	0.00E+00	2.71E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-13	1.39E-13	6.44E-13
	Cl-36	mSv/a	6.70E-19	6.20E-23	0.00E+00	0.00E+00	1.34E-20	2.03E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-15	1.17E-15	3.00E-15
	Cm-244	mSv/a	7.43E-11	5.20E-20	0.00E+00	0.00E+00	9.63E-15	1.14E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-12	1.92E-13	7.67E-11
	Co-60	mSv/a	3.33E-08	1.47E-09	0.00E+00	0.00E+00	5.82E-10	3.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-06	1.01E-06	5.32E-06
	Cs-137	mSv/a	2.34E-11	9.03E-13	0.00E+00	0.00E+00	1.59E-12	2.27E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-08	4.58E-07	4.88E-07
	Eu-152	mSv/a	5.60E-13	3.37E-15	0.00E+00	0.00E+00	7.38E-16	7.89E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-12	1.82E-12	1.17E-11
	Eu-154	mSv/a	3.29E-12	1.62E-14	0.00E+00	0.00E+00	5.08E-15	3.73E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.62E-12	1.27E-11	6.29E-11
	Eu-155	mSv/a	5.69E-14	7.37E-17	0.00E+00	0.00E+00	9.96E-17	2.02E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-13	2.56E-13	7.09E-13
	Fe-55	mSv/a	1.75E-10	0.00E+00	0.00E+00	0.00E+00	6.99E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-08	2.83E-08	4.26E-08
	HTO	mSv/a	6.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E-07	6.00E-08	7.96E-07
	I-129	mSv/a	6.32E-16	5.83E-21	0.00E+00	0.00E+00	2.40E-17	6.34E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-13	3.18E-13	4.54E-13
	Nb-94	mSv/a	7.66E-10	1.92E-11	0.00E+00	0.00E+00	4.15E-12	4.67E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.62E-09	1.66E-10	5.53E-08
	Ni-59	mSv/a	2.78E-11	0.00E+00	0.00E+00	0.00E+00	3.71E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-09	1.35E-09	8.09E-09
	Ni-63	mSv/a	1.07E-08	0.00E+00	0.00E+00	0.00E+00	1.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-06	3.96E-07	2.38E-06
	Np-237	mSv/a	3.21E-13	7.23E-20	0.00E+00	0.00E+00	4.04E-17	2.00E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-14	3.60E-15	4.01E-13
	Np-239	mSv/a	3.53E-16	9.75E-18	0.00E+00	0.00E+00	1.02E-19	2.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-15	1.55E-16	2.70E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-07	7.18E-09	1.31E-07
	Pu-238	mSv/a	1.46E-09	6.43E-19	0.00E+00	0.00E+00	2.01E-13	1.36E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-11	7.06E-12	1.51E-09
	Pu-239	mSv/a	3.89E-09	1.57E-18	0.00E+00	0.00E+00	5.57E-13	1.51E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-10	1.94E-11	4.04E-09
	Pu-240	mSv/a	5.54E-09	2.20E-18	0.00E+00	0.00E+00	7.94E-13	4.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-10	2.77E-11	5.76E-09
	Pu-241	mSv/a	2.17E-09	9.25E-19	0.00E+00	0.00E+00	3.32E-13	7.22E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.78E-11	1.19E-11	2.27E-09
	Sr-90	mSv/a	2.08E-10	2.03E-14	0.00E+00	0.00E+00	6.11E-12	2.92E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-07	3.17E-08	1.47E-07
	Tc-99	mSv/a	9.84E-15	2.76E-19	0.00E+00	0.00E+00	1.27E-17	1.63E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-12	2.93E-14	1.09E-12
	U-235	mSv/a	3.29E-14	2.76E-19	0.00E+00	0.00E+00	1.38E-17	7.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-14	1.02E-12	1.08E-12
	U-238	mSv/a	6.59E-13	2.30E-21	0.00E+00	0.00E+00	2.85E-16	1.25E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.19E-13	2.10E-11	2.22E-11
	Total	**mSv/a**	**1.35E-07**	**1.49E-09**	**0.00E+00**	**0.00E+00**	**7.14E-10**	**3.18E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.08E-06**	**1.99E-06**	**9.40E-06**
Infant_1y-Havester	Ag-108m	mSv/a	1.01E-15	6.65E-17	0.00E+00	0.00E+00	3.60E-17	1.60E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-13	4.85E-15	4.16E-13
	Am-241	mSv/a	6.26E-09	1.37E-15	0.00E+00	0.00E+00	2.93E-12	5.57E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-10	2.87E-11	6.56E-09
	Am-243	mSv/a	5.55E-12	3.38E-18	0.00E+00	0.00E+00	2.64E-15	4.34E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-13	2.59E-14	5.86E-12
	C-14	mSv/a	5.87E-13	6.93E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-09	9.04E-10	3.27E-09
	Ca-41	mSv/a	1.88E-16	0.00E+00	0.00E+00	0.00E+00	3.25E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-13	5.06E-14	2.90E-13
	Cl-36	mSv/a	5.64E-19	6.20E-23	0.00E+00	0.00E+00	4.93E-20	2.03E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-15	1.31E-15	3.96E-15
	Cm-244	mSv/a	5.07E-11	6.76E-20	0.00E+00	0.00E+00	2.21E-14	1.48E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-12	1.34E-13	5.29E-11
	Co-60	mSv/a	2.44E-08	1.92E-09	0.00E+00	0.00E+00	1.59E-09	4.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-06	8.30E-07	6.16E-06
	Cs-137	mSv/a	1.10E-11	1.17E-12	0.00E+00	0.00E+00	2.12E-12	2.96E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-08	1.85E-07	2.03E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	3.70E-13	4.39E-15	0.00E+00	0.00E+00	2.33E-15	1.03E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-12	1.74E-12	1.41E-11
	Eu-154	mSv/a	2.46E-12	2.11E-14	0.00E+00	0.00E+00	1.65E-14	4.85E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-11	1.25E-11	7.58E-11
	Eu-155	mSv/a	4.60E-14	9.59E-17	0.00E+00	0.00E+00	3.57E-16	2.62E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-13	2.79E-13	8.61E-13
	Fe-55	mSv/a	1.28E-10	0.00E+00	0.00E+00	0.00E+00	1.69E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-08	2.08E-08	3.44E-08
	HTO	mSv/a	4.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-07	4.28E-08	7.09E-07
	I-129	mSv/a	2.40E-16	7.57E-21	0.00E+00	0.00E+00	3.09E-17	8.25E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-14	1.24E-13	1.93E-13
	Nb-94	mSv/a	5.73E-10	2.50E-11	0.00E+00	0.00E+00	1.31E-11	6.08E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-09	1.59E-10	7.10E-08
	Ni-59	mSv/a	2.66E-11	0.00E+00	0.00E+00	0.00E+00	1.27E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-09	1.40E-09	1.05E-08
	Ni-63	mSv/a	9.39E-09	0.00E+00	0.00E+00	0.00E+00	3.62E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-06	4.00E-07	2.99E-06
	Np-237	mSv/a	1.89E-13	9.39E-20	0.00E+00	0.00E+00	8.56E-17	2.60E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-14	2.31E-15	2.56E-13
	Np-239	mSv/a	3.42E-16	1.27E-17	0.00E+00	0.00E+00	3.80E-19	3.10E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-15	1.75E-16	3.69E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-07	4.98E-09	1.17E-07
	Pu-238	mSv/a	7.92E-10	8.36E-19	0.00E+00	0.00E+00	3.72E-13	1.76E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-11	3.96E-12	8.30E-10
	Pu-239	mSv/a	2.02E-09	2.05E-18	0.00E+00	0.00E+00	9.61E-13	1.96E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.68E-11	1.02E-11	2.11E-09
	Pu-240	mSv/a	2.88E-09	2.87E-18	0.00E+00	0.00E+00	1.37E-12	5.93E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-10	1.45E-11	3.02E-09
	Pu-241	mSv/a	8.21E-10	1.20E-18	0.00E+00	0.00E+00	4.12E-13	9.40E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-11	4.46E-12	8.73E-10
	Sr-90	mSv/a	1.45E-10	2.03E-14	0.00E+00	0.00E+00	8.25E-12	2.92E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.12E-08	1.30E-08	7.46E-08
	Tc-99	mSv/a	7.26E-15	2.76E-19	0.00E+00	0.00E+00	5.20E-17	1.63E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-12	3.64E-14	1.74E-12
	U-235	mSv/a	2.47E-14	3.58E-19	0.00E+00	0.00E+00	2.80E-17	1.01E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-14	6.29E-13	6.75E-13
	U-238	mSv/a	5.00E-13	2.98E-21	0.00E+00	0.00E+00	5.57E-16	1.63E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-13	1.25E-11	1.34E-11
	Total	**mSv/a**	**9.25E-08**	**1.94E-09**	**0.00E+00**	**0.00E+00**	**1.99E-09**	**4.14E-06**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.65E-06**	**1.50E-06**	**1.04E-05**

Table 4-20: Estimated Radiation Dose for Farm F Resident during Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Farm F	Ag-108m	mSv/a	4.62E-14	1.57E-15	3.52E-18	4.39E-19	8.61E-19	2.50E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-13	1.01E-12	3.90E-12
	Am-241	mSv/a	6.32E-07	3.23E-14	0.00E+00	0.00E+00	1.81E-13	8.71E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-10	6.17E-09	6.39E-07
	Am-243	mSv/a	5.55E-10	7.97E-17	2.94E-16	1.99E-20	1.63E-16	6.78E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-13	5.55E-12	5.62E-10
	C-14	mSv/a	3.08E-11	3.54E-14	5.26E-13	4.39E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-09	2.43E-08	3.05E-08
	Ca-41	mSv/a	1.14E-14	0.00E+00	1.37E-14	0.00E+00	1.36E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-13	6.63E-13	1.28E-12
	Cl-36	mSv/a	2.63E-17	3.16E-21	6.59E-17	2.32E-20	7.70E-22	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-15	2.25E-14	2.54E-14
	Cm-244	mSv/a	3.99E-09	1.59E-18	0.00E+00	0.00E+00	1.05E-15	2.32E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-12	2.28E-11	4.01E-09
	Co-60	mSv/a	1.19E-06	4.51E-08	0.00E+00	0.00E+00	2.29E-11	6.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-06	1.42E-05	8.02E-05
	Cs-137	mSv/a	1.56E-09	2.77E-11	0.00E+00	0.00E+00	2.62E-13	4.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-07	9.77E-07	1.13E-06
	Eu-152	mSv/a	2.58E-11	1.03E-13	0.00E+00	0.00E+00	5.04E-17	1.61E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-12	5.07E-12	1.94E-10
	Eu-154	mSv/a	1.44E-10	4.96E-13	0.00E+00	0.00E+00	3.15E-16	7.59E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-11	3.20E-11	9.49E-10
	Eu-155	mSv/a	2.29E-12	2.26E-15	0.00E+00	0.00E+00	5.95E-18	4.11E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-13	6.24E-13	7.28E-12
	Fe-55	mSv/a	5.75E-09	0.00E+00	0.00E+00	0.00E+00	2.66E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-08	4.10E-07	4.28E-07
	HTO	mSv/a	1.49E-06	0.00E+00	2.40E-06	3.55E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-06	1.91E-06	7.24E-06
	I-129	mSv/a	1.91E-14	1.78E-19	9.20E-14	9.22E-19	1.60E-18	1.17E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-13	1.31E-11	1.34E-11
	Nb-94	mSv/a	2.82E-08	5.88E-10	5.60E-11	8.62E-12	2.63E-13	9.51E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-08	4.61E-09	9.95E-07
	Ni-59	mSv/a	9.24E-10	0.00E+00	1.85E-11	0.00E+00	2.70E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-08	1.76E-08	2.98E-08
	Ni-63	mSv/a	3.94E-07	0.00E+00	0.00E+00	0.00E+00	7.39E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-06	4.84E-06	8.31E-06
	Np-237	mSv/a	1.80E-11	2.21E-18	6.54E-14	2.45E-18	5.14E-18	4.07E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-13	1.73E-13	1.85E-11
	Np-239	mSv/a	1.25E-14	2.97E-16	0.00E+00	0.00E+00	6.08E-21	4.82E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-15	2.79E-15	2.31E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-07	2.07E-07	4.40E-07
	Pu-238	mSv/a	8.17E-08	1.97E-17	0.00E+00	0.00E+00	2.45E-14	2.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-11	4.87E-10	8.23E-08
	Pu-239	mSv/a	2.17E-07	4.82E-17	2.41E-11	1.27E-18	6.55E-14	3.07E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-10	1.30E-09	2.19E-07
	Pu-240	mSv/a	3.10E-07	6.75E-17	7.83E-12	4.20E-19	9.34E-14	9.27E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-10	1.85E-09	3.12E-07
	Pu-241	mSv/a	1.26E-07	2.83E-17	0.00E+00	0.00E+00	3.97E-14	1.47E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-10	8.03E-10	1.28E-07
	Sr-90	mSv/a	7.89E-09	1.03E-12	2.85E-20	5.74E-25	3.62E-13	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-07	1.77E-07	3.46E-07
	Tc-99	mSv/a	3.70E-13	1.41E-17	1.83E-12	1.51E-16	7.94E-19	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-12	3.56E-12	8.02E-12
	U-235	mSv/a	1.27E-12	8.44E-18	2.91E-15	1.49E-18	1.16E-18	1.58E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-14	1.41E-12	2.75E-12
	U-238	mSv/a	2.56E-11	7.03E-20	6.00E-14	1.79E-19	2.39E-17	2.55E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-13	2.91E-11	5.60E-11
	Total	**mSv/a**	**4.49E-06**	**4.57E-08**	**2.40E-06**	**3.55E-08**	**3.18E-11**	**6.48E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**6.03E-06**	**2.28E-05**	**1.01E-04**
Child-10y-Farm F	Ag-108m	mSv/a	6.53E-14	1.57E-15	2.62E-18	4.39E-19	2.21E-17	2.50E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-13	2.72E-12	5.71E-12
	Am-241	mSv/a	5.73E-07	3.23E-14	0.00E+00	0.00E+00	2.74E-12	8.71E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-10	3.83E-09	5.77E-07
	Am-243	mSv/a	5.15E-10	7.97E-17	1.29E-16	1.99E-20	2.47E-15	6.78E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-13	3.45E-12	5.20E-10
	C-14	mSv/a	4.39E-11	3.54E-14	2.89E-13	4.39E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-09	2.88E-08	3.44E-08

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	1.94E-14	0.00E+00	1.38E-14	0.00E+00	4.73E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-13	2.35E-12	3.35E-12
	Cl-36	mSv/a	3.42E-17	3.16E-21	5.36E-17	2.32E-20	2.16E-20	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.67E-15	6.55E-14	6.93E-14
	Cm-244	mSv/a	3.79E-09	1.59E-18	0.00E+00	0.00E+00	1.68E-14	2.32E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-12	2.01E-11	3.81E-09
	Co-60	mSv/a	1.70E-06	4.51E-08	0.00E+00	0.00E+00	1.02E-09	6.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-06	2.82E-05	9.59E-05
	Cs-137	mSv/a	1.19E-09	2.77E-11	0.00E+00	0.00E+00	2.77E-12	4.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-08	6.77E-07	7.78E-07
	Eu-152	mSv/a	2.86E-11	1.03E-13	0.00E+00	0.00E+00	1.29E-15	1.61E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-12	4.73E-12	1.97E-10
	Eu-154	mSv/a	1.68E-10	4.96E-13	0.00E+00	0.00E+00	8.87E-15	7.59E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-11	3.30E-11	9.78E-10
	Eu-155	mSv/a	2.90E-12	2.26E-15	0.00E+00	0.00E+00	1.74E-16	4.11E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-13	6.67E-13	8.04E-12
	Fe-55	mSv/a	8.93E-09	0.00E+00	0.00E+00	0.00E+00	1.22E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-08	6.16E-07	6.51E-07
	HTO	mSv/a	1.77E-06	0.00E+00	1.20E-06	2.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-06	3.28E-06	7.42E-06
	I-129	mSv/a	3.23E-14	1.78E-19	6.33E-14	9.22E-19	3.80E-17	1.17E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-13	2.80E-11	2.84E-11
	Nb-94	mSv/a	3.91E-08	5.88E-10	4.46E-11	8.62E-12	7.24E-12	9.51E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-08	7.58E-09	1.01E-06
	Ni-59	mSv/a	1.42E-09	0.00E+00	1.28E-11	0.00E+00	6.48E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-08	2.93E-08	4.35E-08
	Ni-63	mSv/a	5.46E-07	0.00E+00	0.00E+00	0.00E+00	1.90E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-06	8.60E-06	1.29E-05
	Np-237	mSv/a	1.64E-11	2.21E-18	2.60E-14	2.45E-18	7.06E-17	4.07E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-13	1.09E-13	1.67E-11
	Np-239	mSv/a	1.79E-14	2.97E-16	0.00E+00	0.00E+00	1.78E-19	4.82E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-15	3.51E-15	3.02E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-07	2.33E-07	4.40E-07
	Pu-238	mSv/a	7.43E-08	1.97E-17	0.00E+00	0.00E+00	3.52E-13	2.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.74E-11	4.84E-10	7.49E-08
	Pu-239	mSv/a	1.98E-07	4.82E-17	1.04E-11	1.27E-18	9.72E-13	3.07E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-10	1.33E-09	2.00E-07
	Pu-240	mSv/a	2.83E-07	6.75E-17	3.37E-12	4.20E-19	1.39E-12	9.27E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-10	1.90E-09	2.85E-07
	Pu-241	mSv/a	1.11E-07	2.83E-17	0.00E+00	0.00E+00	5.80E-13	1.47E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-10	8.12E-10	1.12E-07
	Sr-90	mSv/a	1.06E-08	1.03E-12	2.43E-20	5.74E-25	1.07E-11	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-07	5.33E-07	7.66E-07
	Tc-99	mSv/a	5.02E-13	1.41E-17	1.48E-12	1.51E-16	2.22E-17	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-12	5.64E-12	1.06E-11
	U-235	mSv/a	1.68E-12	8.44E-18	1.75E-15	1.49E-18	2.41E-17	1.58E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-14	2.16E-12	3.91E-12
	U-238	mSv/a	3.36E-11	7.03E-20	3.61E-14	1.79E-19	4.97E-16	2.55E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-13	4.46E-11	7.95E-11
	Total	**mSv/a**	**5.32E-06**	**4.57E-08**	**1.20E-06**	**2.96E-08**	**1.25E-09**	**6.48E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**7.54E-06**	**4.22E-05**	**1.21E-04**
Infant_1y-Farm F	Ag-108m	mSv/a	5.18E-14	2.03E-15	0.00E+00	2.77E-19	6.28E-17	3.25E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-13	6.94E-12	1.07E-11
	Am-241	mSv/a	3.19E-07	4.20E-14	0.00E+00	0.00E+00	5.11E-12	1.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-10	2.28E-09	3.22E-07
	Am-243	mSv/a	2.83E-10	1.04E-16	0.00E+00	1.25E-20	4.61E-15	8.82E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-13	2.05E-12	2.86E-10
	C-14	mSv/a	3.00E-11	3.54E-14	0.00E+00	2.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-09	4.46E-08	4.84E-08
	Ca-41	mSv/a	9.59E-15	0.00E+00	0.00E+00	0.00E+00	5.68E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-13	2.52E-12	2.96E-12
	Cl-36	mSv/a	2.88E-17	3.16E-21	0.00E+00	1.12E-20	7.95E-20	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-15	2.17E-13	2.21E-13
	Cm-244	mSv/a	2.59E-09	2.07E-18	0.00E+00	0.00E+00	3.86E-14	3.01E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-12	1.51E-11	2.61E-09
	Co-60	mSv/a	1.24E-06	5.87E-08	0.00E+00	0.00E+00	2.77E-09	8.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-06	3.22E-05	1.19E-04
	Cs-137	mSv/a	5.63E-10	3.59E-11	0.00E+00	0.00E+00	3.69E-12	6.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-08	6.57E-07	7.45E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	1.89E-11	1.34E-13	0.00E+00	0.00E+00	4.07E-15	2.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-12	7.32E-12	2.38E-10
	Eu-154	mSv/a	1.25E-10	6.45E-13	0.00E+00	0.00E+00	2.88E-14	9.86E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-11	5.25E-11	1.19E-09
	Eu-155	mSv/a	2.35E-12	2.94E-15	0.00E+00	0.00E+00	6.24E-16	5.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.76E-13	1.17E-12	9.34E-12
	Fe-55	mSv/a	6.52E-09	0.00E+00	0.00E+00	0.00E+00	2.95E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-08	4.82E-07	5.12E-07
	HTO	mSv/a	1.22E-06	0.00E+00	0.00E+00	1.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.32E-07	6.78E-06	8.95E-06
	I-129	mSv/a	1.23E-14	2.32E-19	0.00E+00	5.81E-19	4.88E-17	1.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-13	3.01E-11	3.03E-11
	Nb-94	mSv/a	2.92E-08	7.64E-10	0.00E+00	5.44E-12	2.29E-11	1.24E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-08	7.78E-09	1.29E-06
	Ni-59	mSv/a	1.36E-09	0.00E+00	0.00E+00	0.00E+00	2.22E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-08	7.74E-08	9.50E-08
	Ni-63	mSv/a	4.79E-07	0.00E+00	0.00E+00	0.00E+00	6.31E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-06	2.21E-05	2.72E-05
	Np-237	mSv/a	9.64E-12	2.88E-18	0.00E+00	1.55E-18	1.50E-16	5.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-13	8.52E-14	9.89E-12
	Np-239	mSv/a	1.74E-14	3.87E-16	0.00E+00	0.00E+00	6.60E-19	6.27E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-15	4.91E-15	3.40E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-07	3.39E-07	4.86E-07
	Pu-238	mSv/a	4.04E-08	2.56E-17	0.00E+00	0.00E+00	6.50E-13	3.58E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-11	4.28E-10	4.09E-08
	Pu-239	mSv/a	1.03E-07	6.27E-17	0.00E+00	7.98E-19	1.68E-12	3.99E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-10	1.10E-09	1.04E-07
	Pu-240	mSv/a	1.47E-07	8.78E-17	0.00E+00	2.65E-19	2.39E-12	1.21E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-10	1.57E-09	1.49E-07
	Pu-241	mSv/a	4.19E-08	3.68E-17	0.00E+00	0.00E+00	7.19E-13	1.91E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-11	4.81E-10	4.26E-08
	Sr-90	mSv/a	7.41E-09	1.03E-12	0.00E+00	2.79E-25	1.44E-11	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-07	6.43E-07	7.63E-07
	Tc-99	mSv/a	3.70E-13	1.41E-17	0.00E+00	7.31E-17	9.08E-17	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-12	1.50E-11	1.99E-11
	U-235	mSv/a	1.26E-12	1.10E-17	0.00E+00	9.37E-19	4.89E-17	2.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-14	3.28E-12	4.60E-12
	U-238	mSv/a	2.55E-11	9.14E-20	0.00E+00	1.13E-19	9.73E-16	3.31E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-13	6.51E-11	9.17E-11
	Total	**mSv/a**	**3.64E-06**	**5.95E-08**	**0.00E+00**	**1.78E-08**	**3.48E-09**	**8.42E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.02E-06**	**6.33E-05**	**1.59E-04**
Infant_1y-Formula-Farm F	Ag-108m	mSv/a	5.18E-14	2.03E-15	4.38E-18	2.77E-19	6.28E-17	3.25E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-13	2.38E-13	3.99E-12
	Am-241	mSv/a	3.19E-07	4.20E-14	0.00E+00	0.00E+00	5.11E-12	1.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-10	2.22E-09	3.22E-07
	Am-243	mSv/a	2.83E-10	1.04E-16	1.41E-16	1.25E-20	4.61E-15	8.82E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-13	2.00E-12	2.86E-10
	C-14	mSv/a	3.00E-11	3.54E-14	3.78E-13	2.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-09	8.21E-09	1.20E-08
	Ca-41	mSv/a	9.59E-15	0.00E+00	9.78E-15	0.00E+00	5.68E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-13	7.48E-14	5.25E-13
	Cl-36	mSv/a	2.88E-17	3.16E-21	1.16E-16	1.12E-20	7.95E-20	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-15	6.67E-15	1.13E-14
	Cm-244	mSv/a	2.59E-09	2.07E-18	0.00E+00	0.00E+00	3.86E-14	3.01E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-12	1.39E-11	2.60E-09
	Co-60	mSv/a	1.24E-06	5.87E-08	0.00E+00	0.00E+00	2.77E-09	8.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-06	2.17E-05	1.08E-04
	Cs-137	mSv/a	5.63E-10	3.59E-11	0.00E+00	0.00E+00	3.69E-12	6.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-08	1.04E-07	1.91E-07
	Eu-152	mSv/a	1.89E-11	1.34E-13	0.00E+00	0.00E+00	4.07E-15	2.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-12	3.33E-12	2.34E-10
	Eu-154	mSv/a	1.25E-10	6.45E-13	0.00E+00	0.00E+00	2.88E-14	9.86E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-11	2.39E-11	1.16E-09
	Eu-155	mSv/a	2.35E-12	2.94E-15	0.00E+00	0.00E+00	6.24E-16	5.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.76E-13	5.34E-13	8.70E-12
	Fe-55	mSv/a	6.52E-09	0.00E+00	0.00E+00	0.00E+00	2.95E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-08	4.44E-07	4.74E-07
	HTO	mSv/a	1.22E-06	0.00E+00	1.66E-06	1.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.32E-07	2.99E-07	4.13E-06

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	I-129	mSv/a	1.23E-14	2.32E-19	4.80E-14	5.81E-19	4.88E-17	1.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-13	1.86E-12	2.04E-12
	Nb-94	mSv/a	2.92E-08	7.64E-10	8.33E-11	5.44E-12	2.29E-11	1.24E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-08	7.52E-09	1.29E-06
	Ni-59	mSv/a	1.36E-09	0.00E+00	2.60E-11	0.00E+00	2.22E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-08	8.92E-09	2.65E-08
	Ni-63	mSv/a	4.79E-07	0.00E+00	0.00E+00	0.00E+00	6.31E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-06	2.54E-06	7.63E-06
	Np-237	mSv/a	9.64E-12	2.88E-18	3.25E-14	1.55E-18	1.50E-16	5.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-13	6.53E-14	9.90E-12
	Np-239	mSv/a	1.74E-14	3.87E-16	0.00E+00	0.00E+00	6.60E-19	6.27E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-15	3.65E-15	3.27E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-07	8.34E-08	2.30E-07
	Pu-238	mSv/a	4.04E-08	2.56E-17	0.00E+00	0.00E+00	6.50E-13	3.58E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-11	2.13E-10	4.07E-08
	Pu-239	mSv/a	1.03E-07	6.27E-17	1.05E-11	7.98E-19	1.68E-12	3.99E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-10	5.47E-10	1.04E-07
	Pu-240	mSv/a	1.47E-07	8.78E-17	3.43E-12	2.65E-19	2.39E-12	1.21E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-10	7.80E-10	1.48E-07
	Pu-241	mSv/a	4.19E-08	3.68E-17	0.00E+00	0.00E+00	7.19E-13	1.91E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-11	2.40E-10	4.24E-08
	Sr-90	mSv/a	7.41E-09	1.03E-12	1.94E-20	2.79E-25	1.44E-11	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-07	1.91E-08	1.39E-07
	Tc-99	mSv/a	3.70E-13	1.41E-17	3.59E-12	7.31E-17	9.08E-17	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-12	2.94E-12	1.14E-11
	U-235	mSv/a	1.26E-12	1.10E-17	2.10E-15	9.37E-19	4.89E-17	2.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-14	4.35E-13	1.76E-12
	U-238	mSv/a	2.55E-11	9.14E-20	4.17E-14	1.13E-19	9.73E-16	3.31E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-13	8.65E-12	3.53E-11
	Total	**mSv/a**	**3.64E-06**	**5.95E-08**	**1.66E-06**	**1.78E-08**	**3.48E-09**	**8.42E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.02E-06**	**2.52E-05**	**1.23E-04**

Table 4-21: Estimated Radiation Dose for Farm F Resident during Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Farm F	Ag-108m	mSv/a	2.45E-14	8.30E-16	1.86E-18	2.32E-19	4.56E-19	1.32E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-13	5.35E-13	2.07E-12
	Am-241	mSv/a	3.35E-07	1.71E-14	0.00E+00	0.00E+00	9.61E-14	4.61E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.89E-10	3.27E-09	3.39E-07
	Am-243	mSv/a	2.94E-10	4.22E-17	1.56E-16	1.06E-20	8.65E-17	3.59E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-13	2.94E-12	2.98E-10
	C-14	mSv/a	1.63E-11	1.87E-14	2.79E-13	2.32E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-09	1.29E-08	1.62E-08
	Ca-41	mSv/a	6.04E-15	0.00E+00	7.27E-15	0.00E+00	7.21E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-13	3.51E-13	6.77E-13
	Cl-36	mSv/a	1.39E-17	1.68E-21	3.49E-17	1.23E-20	4.08E-22	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-15	1.19E-14	1.34E-14
	Cm-244	mSv/a	2.11E-09	8.44E-19	0.00E+00	0.00E+00	5.55E-16	1.23E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-12	1.21E-11	2.13E-09
	Co-60	mSv/a	6.31E-07	2.39E-08	0.00E+00	0.00E+00	1.21E-11	3.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-07	7.53E-06	4.25E-05
	Cs-137	mSv/a	8.27E-10	1.47E-11	0.00E+00	0.00E+00	1.39E-13	2.45E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-08	5.17E-07	6.00E-07
	Eu-152	mSv/a	1.37E-11	5.47E-14	0.00E+00	0.00E+00	2.67E-17	8.51E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-12	2.68E-12	1.03E-10
	Eu-154	mSv/a	7.64E-11	2.63E-13	0.00E+00	0.00E+00	1.67E-16	4.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-12	1.70E-11	5.03E-10
	Eu-155	mSv/a	1.21E-12	1.20E-15	0.00E+00	0.00E+00	3.15E-18	2.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-13	3.31E-13	3.86E-12
	Fe-55	mSv/a	3.05E-09	0.00E+00	0.00E+00	0.00E+00	1.41E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-09	2.17E-07	2.27E-07
	HTO	mSv/a	1.49E-06	0.00E+00	2.40E-06	3.55E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-06	1.91E-06	7.24E-06
	I-129	mSv/a	1.01E-14	9.46E-20	4.88E-14	4.88E-19	8.47E-19	6.19E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-13	6.93E-12	7.11E-12
	Nb-94	mSv/a	1.50E-08	3.11E-10	2.97E-11	4.57E-12	1.39E-13	5.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-09	2.44E-09	5.27E-07
	Ni-59	mSv/a	4.90E-10	0.00E+00	9.79E-12	0.00E+00	1.43E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-09	9.33E-09	1.58E-08
	Ni-63	mSv/a	2.09E-07	0.00E+00	0.00E+00	0.00E+00	3.92E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-06	2.56E-06	4.40E-06
	Np-237	mSv/a	9.55E-12	1.17E-18	3.46E-14	1.30E-18	2.72E-18	2.16E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-13	9.19E-14	9.81E-12
	Np-239	mSv/a	6.64E-15	1.58E-16	0.00E+00	0.00E+00	3.22E-21	2.56E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-15	1.48E-15	1.22E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-07	2.07E-07	4.40E-07
	Pu-238	mSv/a	4.33E-08	1.04E-17	0.00E+00	0.00E+00	1.30E-14	1.46E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-11	2.58E-10	4.36E-08
	Pu-239	mSv/a	1.15E-07	2.55E-17	1.28E-11	6.71E-19	3.47E-14	1.62E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-10	6.87E-10	1.16E-07
	Pu-240	mSv/a	1.64E-07	3.58E-17	4.15E-12	2.23E-19	4.95E-14	4.91E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-10	9.79E-10	1.65E-07
	Pu-241	mSv/a	6.70E-08	1.50E-17	0.00E+00	0.00E+00	2.10E-14	7.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.65E-11	4.25E-10	6.76E-08
	Sr-90	mSv/a	4.18E-09	5.48E-13	1.51E-20	3.04E-25	1.92E-13	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.33E-08	9.39E-08	1.83E-07
	Tc-99	mSv/a	1.96E-13	7.47E-18	9.72E-13	7.99E-17	4.21E-19	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-12	1.89E-12	4.25E-12
	U-235	mSv/a	6.74E-13	4.47E-18	1.54E-15	7.88E-19	6.15E-19	8.39E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-14	7.48E-13	1.46E-12
	U-238	mSv/a	1.36E-11	3.72E-20	3.18E-14	9.47E-20	1.27E-17	1.35E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.16E-13	1.54E-11	2.97E-11
	Total	**mSv/a**	**3.07E-06**	**2.42E-08**	**2.40E-06**	**3.55E-08**	**1.69E-11**	**3.43E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.97E-06**	**1.31E-05**	**5.69E-05**
Child-10y-Farm F	Ag-108m	mSv/a	3.46E-14	8.30E-16	1.39E-18	2.32E-19	1.17E-17	1.32E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-13	1.44E-12	3.03E-12
	Am-241	mSv/a	3.03E-07	1.71E-14	0.00E+00	0.00E+00	1.45E-12	4.61E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-10	2.03E-09	3.06E-07
	Am-243	mSv/a	2.73E-10	4.22E-17	6.81E-17	1.06E-20	1.31E-15	3.59E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-13	1.83E-12	2.75E-10
	C-14	mSv/a	2.33E-11	1.87E-14	1.53E-13	2.32E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-09	1.53E-08	1.82E-08

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	1.03E-14	0.00E+00	7.31E-15	0.00E+00	2.50E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-13	1.24E-12	1.78E-12
	Cl-36	mSv/a	1.81E-17	1.68E-21	2.84E-17	1.23E-20	1.15E-20	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-15	3.47E-14	3.67E-14
	Cm-244	mSv/a	2.01E-09	8.44E-19	0.00E+00	0.00E+00	8.91E-15	1.23E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-12	1.06E-11	2.02E-09
	Co-60	mSv/a	9.00E-07	2.39E-08	0.00E+00	0.00E+00	5.39E-10	3.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-06	1.50E-05	5.08E-05
	Cs-137	mSv/a	6.33E-10	1.47E-11	0.00E+00	0.00E+00	1.47E-12	2.45E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-08	3.59E-07	4.12E-07
	Eu-152	mSv/a	1.52E-11	5.47E-14	0.00E+00	0.00E+00	6.83E-16	8.51E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-12	2.51E-12	1.04E-10
	Eu-154	mSv/a	8.91E-11	2.63E-13	0.00E+00	0.00E+00	4.70E-15	4.02E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.40E-12	1.75E-11	5.18E-10
	Eu-155	mSv/a	1.54E-12	1.20E-15	0.00E+00	0.00E+00	9.22E-17	2.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-13	3.53E-13	4.26E-12
	Fe-55	mSv/a	4.73E-09	0.00E+00	0.00E+00	0.00E+00	6.46E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-08	3.26E-07	3.45E-07
	HTO	mSv/a	1.77E-06	0.00E+00	1.20E-06	2.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-06	3.28E-06	7.42E-06
	I-129	mSv/a	1.71E-14	9.46E-20	3.35E-14	4.88E-19	2.01E-17	6.19E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-13	1.49E-11	1.50E-11
	Nb-94	mSv/a	2.07E-08	3.11E-10	2.36E-11	4.57E-12	3.84E-12	5.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.46E-09	4.02E-09	5.36E-07
	Ni-59	mSv/a	7.52E-10	0.00E+00	6.81E-12	0.00E+00	3.43E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.76E-09	1.55E-08	2.31E-08
	Ni-63	mSv/a	2.89E-07	0.00E+00	0.00E+00	0.00E+00	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-06	4.56E-06	6.83E-06
	Np-237	mSv/a	8.69E-12	1.17E-18	1.38E-14	1.30E-18	3.74E-17	2.16E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-14	5.75E-14	8.86E-12
	Np-239	mSv/a	9.50E-15	1.58E-16	0.00E+00	0.00E+00	9.41E-20	2.56E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-15	1.86E-15	1.60E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-07	2.33E-07	4.40E-07
	Pu-238	mSv/a	3.94E-08	1.04E-17	0.00E+00	0.00E+00	1.86E-13	1.46E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-11	2.56E-10	3.97E-08
	Pu-239	mSv/a	1.05E-07	2.55E-17	5.49E-12	6.71E-19	5.15E-13	1.62E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.84E-11	7.06E-10	1.06E-07
	Pu-240	mSv/a	1.50E-07	3.58E-17	1.78E-12	2.23E-19	7.35E-13	4.91E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-10	1.01E-09	1.51E-07
	Pu-241	mSv/a	5.88E-08	1.50E-17	0.00E+00	0.00E+00	3.07E-13	7.78E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-11	4.30E-10	5.94E-08
	Sr-90	mSv/a	5.63E-09	5.48E-13	1.29E-20	3.04E-25	5.65E-12	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-07	2.82E-07	4.06E-07
	Tc-99	mSv/a	2.66E-13	7.47E-18	7.86E-13	7.99E-17	1.18E-17	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-12	2.99E-12	5.62E-12
	U-235	mSv/a	8.89E-13	4.47E-18	9.28E-16	7.88E-19	1.28E-17	8.39E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-14	1.15E-12	2.07E-12
	U-238	mSv/a	1.78E-11	3.72E-20	1.91E-14	9.47E-20	2.63E-16	1.35E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-13	2.36E-11	4.21E-11
	Total	**mSv/a**	**3.65E-06**	**2.42E-08**	**1.20E-06**	**2.96E-08**	**6.60E-10**	**3.43E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.63E-06**	**2.40E-05**	**6.79E-05**
Infant_1y-Farm F	Ag-108m	mSv/a	2.74E-14	1.08E-15	0.00E+00	1.47E-19	3.33E-17	1.72E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-13	3.68E-12	5.66E-12
	Am-241	mSv/a	1.69E-07	2.23E-14	0.00E+00	0.00E+00	2.71E-12	6.00E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-10	1.21E-09	1.71E-07
	Am-243	mSv/a	1.50E-10	5.49E-17	0.00E+00	6.65E-21	2.44E-15	4.67E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-13	1.09E-12	1.52E-10
	C-14	mSv/a	1.59E-11	1.87E-14	0.00E+00	1.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-09	2.36E-08	2.56E-08
	Ca-41	mSv/a	5.08E-15	0.00E+00	0.00E+00	0.00E+00	3.01E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-13	1.34E-12	1.57E-12
	Cl-36	mSv/a	1.52E-17	1.68E-21	0.00E+00	5.96E-21	4.22E-20	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-15	1.15E-13	1.17E-13
	Cm-244	mSv/a	1.37E-09	1.10E-18	0.00E+00	0.00E+00	2.05E-14	1.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-12	7.98E-12	1.38E-09
	Co-60	mSv/a	6.59E-07	3.11E-08	0.00E+00	0.00E+00	1.47E-09	4.39E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-06	1.70E-05	6.28E-05
	Cs-137	mSv/a	2.98E-10	1.90E-11	0.00E+00	0.00E+00	1.96E-12	3.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-08	3.48E-07	3.95E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Eu-152	mSv/a	1.00E-11	7.12E-14	0.00E+00	0.00E+00	2.15E-15	1.11E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-12	3.88E-12	1.26E-10
	Eu-154	mSv/a	6.65E-11	3.42E-13	0.00E+00	0.00E+00	1.53E-14	5.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-11	2.78E-11	6.29E-10
	Eu-155	mSv/a	1.24E-12	1.56E-15	0.00E+00	0.00E+00	3.31E-16	2.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-13	6.21E-13	4.95E-12
	Fe-55	mSv/a	3.45E-09	0.00E+00	0.00E+00	0.00E+00	1.56E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-08	2.55E-07	2.71E-07
	HTO	mSv/a	1.22E-06	0.00E+00	0.00E+00	1.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.32E-07	6.78E-06	8.95E-06
	I-129	mSv/a	6.50E-15	1.23E-19	0.00E+00	3.08E-19	2.58E-17	8.05E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-14	1.60E-11	1.60E-11
	Nb-94	mSv/a	1.55E-08	4.05E-10	0.00E+00	2.88E-12	1.21E-11	6.55E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-09	4.12E-09	6.84E-07
	Ni-59	mSv/a	7.18E-10	0.00E+00	0.00E+00	0.00E+00	1.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-09	4.10E-08	5.03E-08
	Ni-63	mSv/a	2.54E-07	0.00E+00	0.00E+00	0.00E+00	3.34E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-06	1.17E-05	1.44E-05
	Np-237	mSv/a	5.11E-12	1.52E-18	0.00E+00	8.21E-19	7.92E-17	2.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-14	4.52E-14	5.24E-12
	Np-239	mSv/a	9.22E-15	2.05E-16	0.00E+00	0.00E+00	3.50E-19	3.32E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-15	2.60E-15	1.80E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-07	3.39E-07	4.86E-07
	Pu-238	mSv/a	2.14E-08	1.36E-17	0.00E+00	0.00E+00	3.45E-13	1.90E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-11	2.27E-10	2.17E-08
	Pu-239	mSv/a	5.45E-08	3.32E-17	0.00E+00	4.23E-19	8.89E-13	2.11E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.32E-11	5.83E-10	5.52E-08
	Pu-240	mSv/a	7.78E-08	4.65E-17	0.00E+00	1.40E-19	1.27E-12	6.39E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-11	8.31E-10	7.87E-08
	Pu-241	mSv/a	2.22E-08	1.95E-17	0.00E+00	0.00E+00	3.81E-13	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-11	2.55E-10	2.26E-08
	Sr-90	mSv/a	3.93E-09	5.48E-13	0.00E+00	1.48E-25	7.63E-12	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-08	3.41E-07	4.04E-07
	Tc-99	mSv/a	1.96E-13	7.47E-18	0.00E+00	3.87E-17	4.81E-17	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-12	7.94E-12	1.05E-11
	U-235	mSv/a	6.69E-13	5.81E-18	0.00E+00	4.97E-19	2.59E-17	1.09E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-14	1.74E-12	2.44E-12
	U-238	mSv/a	1.35E-11	4.84E-20	0.00E+00	5.96E-20	5.15E-16	1.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-13	3.45E-11	4.86E-11
	Total	**mSv/a**	**2.50E-06**	**3.15E-08**	**0.00E+00**	**1.78E-08**	**1.85E-09**	**4.46E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.76E-06**	**3.69E-05**	**8.88E-05**
Infant_1y-Formula-Farm F	Ag-108m	mSv/a	2.74E-14	1.08E-15	2.32E-18	1.47E-19	3.33E-17	1.72E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-13	1.26E-13	2.11E-12
	Am-241	mSv/a	1.69E-07	2.23E-14	0.00E+00	0.00E+00	2.71E-12	6.00E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-10	1.18E-09	1.71E-07
	Am-243	mSv/a	1.50E-10	5.49E-17	7.50E-17	6.65E-21	2.44E-15	4.67E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-13	1.06E-12	1.52E-10
	C-14	mSv/a	1.59E-11	1.87E-14	2.00E-13	1.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-09	4.35E-09	6.37E-09
	Ca-41	mSv/a	5.08E-15	0.00E+00	5.18E-15	0.00E+00	3.01E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-13	3.96E-14	2.78E-13
	Cl-36	mSv/a	1.52E-17	1.68E-21	6.16E-17	5.96E-21	4.22E-20	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-15	3.54E-15	5.98E-15
	Cm-244	mSv/a	1.37E-09	1.10E-18	0.00E+00	0.00E+00	2.05E-14	1.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-12	7.38E-12	1.38E-09
	Co-60	mSv/a	6.59E-07	3.11E-08	0.00E+00	0.00E+00	1.47E-09	4.39E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-06	1.15E-05	5.73E-05
	Cs-137	mSv/a	2.98E-10	1.90E-11	0.00E+00	0.00E+00	1.96E-12	3.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-08	5.49E-08	1.01E-07
	Eu-152	mSv/a	1.00E-11	7.12E-14	0.00E+00	0.00E+00	2.15E-15	1.11E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-12	1.77E-12	1.24E-10
	Eu-154	mSv/a	6.65E-11	3.42E-13	0.00E+00	0.00E+00	1.53E-14	5.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-11	1.27E-11	6.14E-10
	Eu-155	mSv/a	1.24E-12	1.56E-15	0.00E+00	0.00E+00	3.31E-16	2.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-13	2.83E-13	4.61E-12
	Fe-55	mSv/a	3.45E-09	0.00E+00	0.00E+00	0.00E+00	1.56E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-08	2.36E-07	2.51E-07
	HTO	mSv/a	1.22E-06	0.00E+00	1.66E-06	1.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.32E-07	2.99E-07	4.13E-06

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	I-129	mSv/a	6.50E-15	1.23E-19	2.54E-14	3.08E-19	2.58E-17	8.05E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-14	9.85E-13	1.08E-12
	Nb-94	mSv/a	1.55E-08	4.05E-10	4.41E-11	2.88E-12	1.21E-11	6.55E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-09	3.99E-09	6.84E-07
	Ni-59	mSv/a	7.18E-10	0.00E+00	1.38E-11	0.00E+00	1.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-09	4.73E-09	1.40E-08
	Ni-63	mSv/a	2.54E-07	0.00E+00	0.00E+00	0.00E+00	3.34E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-06	1.35E-06	4.05E-06
	Np-237	mSv/a	5.11E-12	1.52E-18	1.72E-14	8.21E-19	7.92E-17	2.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-14	3.46E-14	5.25E-12
	Np-239	mSv/a	9.22E-15	2.05E-16	0.00E+00	0.00E+00	3.50E-19	3.32E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-15	1.94E-15	1.73E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-07	8.34E-08	2.30E-07
	Pu-238	mSv/a	2.14E-08	1.36E-17	0.00E+00	0.00E+00	3.45E-13	1.90E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-11	1.13E-10	2.16E-08
	Pu-239	mSv/a	5.45E-08	3.32E-17	5.59E-12	4.23E-19	8.89E-13	2.11E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.32E-11	2.90E-10	5.49E-08
	Pu-240	mSv/a	7.78E-08	4.65E-17	1.82E-12	1.40E-19	1.27E-12	6.39E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-11	4.13E-10	7.83E-08
	Pu-241	mSv/a	2.22E-08	1.95E-17	0.00E+00	0.00E+00	3.81E-13	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-11	1.27E-10	2.25E-08
	Sr-90	mSv/a	3.93E-09	5.48E-13	1.03E-20	1.48E-25	7.63E-12	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-08	1.01E-08	7.37E-08
	Tc-99	mSv/a	1.96E-13	7.47E-18	1.90E-12	3.87E-17	4.81E-17	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-12	1.56E-12	6.04E-12
	U-235	mSv/a	6.69E-13	5.81E-18	1.11E-15	4.97E-19	2.59E-17	1.09E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-14	2.31E-13	9.30E-13
	U-238	mSv/a	1.35E-11	4.84E-20	2.21E-14	5.96E-20	5.15E-16	1.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-13	4.58E-12	1.87E-11
	Total	**mSv/a**	**2.50E-06**	**3.15E-08**	**1.66E-06**	**1.78E-08**	**1.85E-09**	**4.46E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.76E-06**	**1.36E-05**	**6.72E-05**

Table 4-22: Estimated Radiation Dose for Farm F 3-Month Old Resident during Grouting – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant - Farm F	Ag-108m	mSv/a	2.18E-14	2.03E-15	5.85E-18	2.77E-19	3.91E-17	3.25E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-12
	Am-241	mSv/a	1.42E-07	4.20E-14	0.00E+00	0.00E+00	3.19E-11	1.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-07
	Am-243	mSv/a	1.26E-10	1.04E-16	1.84E-15	1.25E-20	2.79E-14	8.82E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-10
	C-14	mSv/a	1.26E-11	3.54E-14	4.42E-13	2.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-11
	Ca-41	mSv/a	6.52E-15	0.00E+00	3.01E-14	0.00E+00	8.16E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.67E-14
	Cl-36	mSv/a	1.44E-17	3.16E-21	2.42E-16	1.12E-20	7.71E-20	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-16
	Cm-244	mSv/a	1.18E-09	2.07E-18	0.00E+00	0.00E+00	2.41E-13	3.01E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-09
	Co-60	mSv/a	6.47E-07	5.87E-08	0.00E+00	0.00E+00	3.45E-09	8.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.36E-05
	Cs-137	mSv/a	3.86E-10	3.59E-11	0.00E+00	0.00E+00	4.03E-12	6.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.05E-08
	Eu-152	mSv/a	8.73E-12	1.34E-13	0.00E+00	0.00E+00	5.48E-15	2.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-10
	Eu-154	mSv/a	5.63E-11	6.45E-13	0.00E+00	0.00E+00	3.74E-14	9.86E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-09
	Eu-155	mSv/a	1.12E-12	2.94E-15	0.00E+00	0.00E+00	7.60E-16	5.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-12
	Fe-55	mSv/a	3.72E-09	0.00E+00	0.00E+00	0.00E+00	5.82E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-09
	HTO	mSv/a	6.73E-07	0.00E+00	2.93E-06	1.43E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.61E-06
	I-129	mSv/a	4.39E-15	2.32E-19	5.24E-14	5.81E-19	2.49E-17	1.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-14
	Nb-94	mSv/a	1.43E-08	7.64E-10	1.72E-10	5.44E-12	2.21E-11	1.24E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-06
	Ni-59	mSv/a	7.27E-10	0.00E+00	6.53E-11	0.00E+00	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.95E-10
	Ni-63	mSv/a	2.65E-07	0.00E+00	0.00E+00	0.00E+00	7.49E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-07
	Np-237	mSv/a	4.46E-12	2.88E-18	4.14E-13	1.55E-18	8.87E-16	5.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.93E-12
	Np-239	mSv/a	1.03E-14	3.87E-16	0.00E+00	0.00E+00	6.42E-19	6.27E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	1.79E-08	2.56E-17	0.00E+00	0.00E+00	4.05E-12	3.58E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-08
	Pu-239	mSv/a	4.50E-08	6.27E-17	1.41E-10	7.98E-19	1.05E-11	3.99E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-08
	Pu-240	mSv/a	6.42E-08	8.78E-17	4.58E-11	2.65E-19	1.49E-11	1.21E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.42E-08
	Pu-241	mSv/a	1.65E-08	3.68E-17	0.00E+00	0.00E+00	4.40E-12	1.91E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-08
	Sr-90	mSv/a	4.25E-09	1.03E-12	8.15E-20	2.79E-25	2.83E-11	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-09
	Tc-99	mSv/a	2.04E-13	1.41E-17	9.98E-12	7.31E-17	1.18E-16	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-11
	U-235	mSv/a	6.90E-13	1.10E-17	7.54E-15	9.37E-19	8.21E-17	2.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.19E-13
	U-238	mSv/a	1.37E-11	9.14E-20	1.58E-13	1.13E-19	1.72E-15	3.31E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-11
	Total	**mSv/a**	**1.90E-06**	**5.95E-08**	**2.93E-06**	**1.43E-08**	**4.38E-09**	**8.42E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.91E-05**
3mo.-Nursing Infant Formula - Farm F	Ag-108m	mSv/a	2.18E-14	2.03E-15	0.00E+00	2.77E-19	3.91E-17	3.25E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-13	3.39E-12
	Am-241	mSv/a	1.42E-07	4.20E-14	0.00E+00	0.00E+00	3.19E-11	1.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-10	1.42E-07
	Am-243	mSv/a	1.26E-10	1.04E-16	0.00E+00	1.25E-20	2.79E-14	8.82E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-13	1.27E-10
	C-14	mSv/a	1.26E-11	3.54E-14	0.00E+00	2.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-08	5.02E-08
	Ca-41	mSv/a	6.52E-15	0.00E+00	0.00E+00	0.00E+00	8.16E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-12	1.10E-12

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cl-36	mSv/a	1.44E-17	3.16E-21	0.00E+00	1.12E-20	7.71E-20	2.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-13	1.12E-13
	Cm-244	mSv/a	1.18E-09	2.07E-18	0.00E+00	0.00E+00	2.41E-13	3.01E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-12	1.19E-09
	Co-60	mSv/a	6.47E-07	5.87E-08	0.00E+00	0.00E+00	3.45E-09	8.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-05	9.48E-05
	Cs-137	mSv/a	3.86E-10	3.59E-11	0.00E+00	0.00E+00	4.03E-12	6.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-07	3.65E-07
	Eu-152	mSv/a	8.73E-12	1.34E-13	0.00E+00	0.00E+00	5.48E-15	2.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-12	2.19E-10
	Eu-154	mSv/a	5.63E-11	6.45E-13	0.00E+00	0.00E+00	3.74E-14	9.86E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.88E-12	1.05E-09
	Eu-155	mSv/a	1.12E-12	2.94E-15	0.00E+00	0.00E+00	7.60E-16	5.34E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-13	6.67E-12
	Fe-55	mSv/a	3.72E-09	0.00E+00	0.00E+00	0.00E+00	5.82E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-08	2.89E-08
	HTO	mSv/a	6.73E-07	0.00E+00	0.00E+00	1.43E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-05	1.07E-05
	I-129	mSv/a	4.39E-15	2.32E-19	0.00E+00	5.81E-19	2.49E-17	1.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.87E-12	7.87E-12
	Nb-94	mSv/a	1.43E-08	7.64E-10	0.00E+00	5.44E-12	2.21E-11	1.24E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-10	1.25E-06
	Ni-59	mSv/a	7.27E-10	0.00E+00	0.00E+00	0.00E+00	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-09	3.31E-09
	Ni-63	mSv/a	2.65E-07	0.00E+00	0.00E+00	0.00E+00	7.49E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-07	1.01E-06
	Np-237	mSv/a	4.46E-12	2.88E-18	0.00E+00	1.55E-18	8.87E-16	5.29E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.47E-15	4.53E-12
	Np-239	mSv/a	1.03E-14	3.87E-16	0.00E+00	0.00E+00	6.42E-19	6.27E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E-16	1.76E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-07	3.21E-07
	Pu-238	mSv/a	1.79E-08	2.56E-17	0.00E+00	0.00E+00	4.05E-12	3.58E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-11	1.79E-08
	Pu-239	mSv/a	4.50E-08	6.27E-17	0.00E+00	7.98E-19	1.05E-11	3.99E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.18E-11	4.51E-08
	Pu-240	mSv/a	6.42E-08	8.78E-17	0.00E+00	2.65E-19	1.49E-11	1.21E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.81E-11	6.43E-08
	Pu-241	mSv/a	1.65E-08	3.68E-17	0.00E+00	0.00E+00	4.40E-12	1.91E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-11	1.68E-08
	Sr-90	mSv/a	4.25E-09	1.03E-12	0.00E+00	2.79E-25	2.83E-11	3.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-07	3.86E-07
	Tc-99	mSv/a	2.04E-13	1.41E-17	0.00E+00	7.31E-17	1.18E-16	1.84E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-12	3.01E-12
	U-235	mSv/a	6.90E-13	1.10E-17	0.00E+00	9.37E-19	8.21E-17	2.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-14	7.25E-13
	U-238	mSv/a	1.37E-11	9.14E-20	0.00E+00	1.13E-19	1.72E-15	3.31E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-13	1.43E-11
	Total	**mSv/a**	**1.90E-06**	**5.95E-08**	**0.00E+00**	**1.43E-08**	**4.38E-09**	**8.42E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.30E-05**	**1.09E-04**

Table 4-23: Estimated Radiation Dose for Farm F 3-Month Old Resident during Grouting – Average

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant - Farm F	Ag-108m	mSv/a	1.15E-14	1.08E-15	3.10E-18	1.47E-19	2.07E-17	1.72E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-12
	Am-241	mSv/a	7.53E-08	2.23E-14	0.00E+00	0.00E+00	1.69E-11	6.00E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E-08
	Am-243	mSv/a	6.68E-11	5.49E-17	9.74E-16	6.65E-21	1.48E-14	4.67E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-11
	C-14	mSv/a	6.68E-12	1.87E-14	2.34E-13	1.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E-12
	Ca-41	mSv/a	3.45E-15	0.00E+00	1.60E-14	0.00E+00	4.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-14
	Cl-36	mSv/a	7.65E-18	1.68E-21	1.28E-16	5.96E-21	4.08E-20	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-16
	Cm-244	mSv/a	6.28E-10	1.10E-18	0.00E+00	0.00E+00	1.28E-13	1.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.28E-10
	Co-60	mSv/a	3.43E-07	3.11E-08	0.00E+00	0.00E+00	1.83E-09	4.39E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.43E-05
	Cs-137	mSv/a	2.05E-10	1.90E-11	0.00E+00	0.00E+00	2.13E-12	3.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-08
	Eu-152	mSv/a	4.63E-12	7.12E-14	0.00E+00	0.00E+00	2.90E-15	1.11E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-10
	Eu-154	mSv/a	2.98E-11	3.42E-13	0.00E+00	0.00E+00	1.98E-14	5.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.53E-10
	Eu-155	mSv/a	5.91E-13	1.56E-15	0.00E+00	0.00E+00	4.03E-16	2.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-12
	Fe-55	mSv/a	1.97E-09	0.00E+00	0.00E+00	0.00E+00	3.09E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-09
	HTO	mSv/a	6.73E-07	0.00E+00	2.93E-06	1.43E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.61E-06
	I-129	mSv/a	2.33E-15	1.23E-19	2.78E-14	3.08E-19	1.32E-17	8.05E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-14
	Nb-94	mSv/a	7.57E-09	4.05E-10	9.11E-11	2.88E-12	1.17E-11	6.55E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.63E-07
	Ni-59	mSv/a	3.85E-10	0.00E+00	3.46E-11	0.00E+00	1.38E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-10
	Ni-63	mSv/a	1.41E-07	0.00E+00	0.00E+00	0.00E+00	3.97E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-07
	Np-237	mSv/a	2.36E-12	1.52E-18	2.19E-13	8.21E-19	4.70E-16	2.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-12
	Np-239	mSv/a	5.45E-15	2.05E-16	0.00E+00	0.00E+00	3.40E-19	3.32E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.98E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-238	mSv/a	9.50E-09	1.36E-17	0.00E+00	0.00E+00	2.15E-12	1.90E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-09
	Pu-239	mSv/a	2.38E-08	3.32E-17	7.46E-11	4.23E-19	5.54E-12	2.11E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-08
	Pu-240	mSv/a	3.40E-08	4.65E-17	2.43E-11	1.40E-19	7.90E-12	6.39E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-08
	Pu-241	mSv/a	8.77E-09	1.95E-17	0.00E+00	0.00E+00	2.33E-12	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-09
	Sr-90	mSv/a	2.25E-09	5.48E-13	4.32E-20	1.48E-25	1.50E-11	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-09
	Tc-99	mSv/a	1.08E-13	7.47E-18	5.29E-12	3.87E-17	6.25E-17	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-12
	U-235	mSv/a	3.66E-13	5.81E-18	4.00E-15	4.97E-19	4.35E-17	1.09E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-13
	U-238	mSv/a	7.27E-12	4.84E-20	8.36E-14	5.96E-20	9.10E-16	1.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.53E-12
	Total	**mSv/a**	**1.32E-06**	**3.15E-08**	**2.93E-06**	**1.43E-08**	**2.32E-09**	**4.46E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.89E-05**
3mo.-Nursing Infant Formula - Farm F	Ag-108m	mSv/a	1.15E-14	1.08E-15	0.00E+00	1.47E-19	2.07E-17	1.72E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.36E-14	1.80E-12
	Am-241	mSv/a	7.53E-08	2.23E-14	0.00E+00	0.00E+00	1.69E-11	6.00E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.17E-11	7.55E-08
	Am-243	mSv/a	6.68E-11	5.49E-17	0.00E+00	6.65E-21	1.48E-14	4.67E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.03E-14	6.74E-11
	C-14	mSv/a	6.68E-12	1.87E-14	0.00E+00	1.13E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-08	2.66E-08
	Ca-41	mSv/a	3.45E-15	0.00E+00	0.00E+00	0.00E+00	4.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-13	5.86E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cl-36	mSv/a	7.65E-18	1.68E-21	0.00E+00	5.96E-21	4.08E-20	1.12E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-14	5.91E-14
	Cm-244	mSv/a	6.28E-10	1.10E-18	0.00E+00	0.00E+00	1.28E-13	1.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.33E-13	6.28E-10
	Co-60	mSv/a	3.43E-07	3.11E-08	0.00E+00	0.00E+00	1.83E-09	4.39E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.92E-06	5.02E-05
	Cs-137	mSv/a	2.05E-10	1.90E-11	0.00E+00	0.00E+00	2.13E-12	3.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-07	1.94E-07
	Eu-152	mSv/a	4.63E-12	7.12E-14	0.00E+00	0.00E+00	2.90E-15	1.11E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.56E-13	1.16E-10
	Eu-154	mSv/a	2.98E-11	3.42E-13	0.00E+00	0.00E+00	1.98E-14	5.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-12	5.58E-10
	Eu-155	mSv/a	5.91E-13	1.56E-15	0.00E+00	0.00E+00	4.03E-16	2.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-13	3.53E-12
	Fe-55	mSv/a	1.97E-09	0.00E+00	0.00E+00	0.00E+00	3.09E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-08	1.53E-08
	HTO	mSv/a	6.73E-07	0.00E+00	0.00E+00	1.43E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-05	1.07E-05
	I-129	mSv/a	2.33E-15	1.23E-19	0.00E+00	3.08E-19	1.32E-17	8.05E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-12	4.17E-12
	Nb-94	mSv/a	7.57E-09	4.05E-10	0.00E+00	2.88E-12	1.17E-11	6.55E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.42E-11	6.63E-07
	Ni-59	mSv/a	3.85E-10	0.00E+00	0.00E+00	0.00E+00	1.38E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-09	1.75E-09
	Ni-63	mSv/a	1.41E-07	0.00E+00	0.00E+00	0.00E+00	3.97E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E-07	5.35E-07
	Np-237	mSv/a	2.36E-12	1.52E-18	0.00E+00	8.21E-19	4.70E-16	2.81E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-15	2.40E-12
	Np-239	mSv/a	5.45E-15	2.05E-16	0.00E+00	0.00E+00	3.40E-19	3.32E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-16	9.33E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-07	3.21E-07
	Pu-238	mSv/a	9.50E-09	1.36E-17	0.00E+00	0.00E+00	2.15E-12	1.90E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-11	9.51E-09
	Pu-239	mSv/a	2.38E-08	3.32E-17	0.00E+00	4.23E-19	5.54E-12	2.11E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-11	2.39E-08
	Pu-240	mSv/a	3.40E-08	4.65E-17	0.00E+00	1.40E-19	7.90E-12	6.39E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.67E-11	3.41E-08
	Pu-241	mSv/a	8.77E-09	1.95E-17	0.00E+00	0.00E+00	2.33E-12	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-11	8.89E-09
	Sr-90	mSv/a	2.25E-09	5.48E-13	0.00E+00	1.48E-25	1.50E-11	1.75E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-07	2.04E-07
	Tc-99	mSv/a	1.08E-13	7.47E-18	0.00E+00	3.87E-17	6.25E-17	9.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-12	1.60E-12
	U-235	mSv/a	3.66E-13	5.81E-18	0.00E+00	4.97E-19	4.35E-17	1.09E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-15	3.84E-13
	U-238	mSv/a	7.27E-12	4.84E-20	0.00E+00	5.96E-20	9.10E-16	1.76E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-13	7.59E-12
	Total	**mSv/a**	**1.32E-06**	**3.15E-08**	**0.00E+00**	**1.43E-08**	**2.32E-09**	**4.46E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.70E-05**	**6.30E-05**

4.2.7 Uncertainties in Exposure Assessment

The IMPACT™ model was used to predict dose to identified human receptors during the closure phase. The IMPACT™ model used is a steady state model; however, it includes time dependent equations to account for buildup in soil from irrigation, for all radionuclides released.

It includes progeny buildup through use of progeny inclusive dose coefficients. Forty years of ingrowth was used to develop the progeny inclusive dose coefficients for each radionuclide, which is the timeframe used in CSA N288.1-14 for development of progeny-inclusive dose coefficients for sediment and soil exposure.

Exposure factors were based on best-available information from literature with preference for exposure factors identified in CSA N288.1-14 (2014). For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6.

The stack exit velocity used in the air modeling is the same value that was used in the DRL Report (CNL 2016b). However, at some point during the Project, active ventilation systems will be removed, resulting in an exit velocity of zero. This is expected to occur in Phase 3, when significant emissions are not anticipated. To explore sensitivity to exit velocity, the models were run again with the stack exit velocity set to 0 m/s. On-site doses were approximately 50 times higher, whereas off-site doses were only slightly increased with stack exit velocity at zero.

4.3 Toxicity Assessment

4.3.1 Toxicological Reference Values (TRVs)

No TRVs are needed as no non-radiological COPCs have been identified for the closure phase, as per Section 4.1.2.2.

4.3.2 Radiation Dose Limits and Targets

The public dose limit for radiation protection is 1 mSv/a, as described in the Radiation Protection Regulations under the *Nuclear Safety and Control Act*. This limit is defined as an incremental dose. It is set at a fraction of natural background exposure to radiation. Public doses arising from licensed facilities are compared to the public dose limit and higher doses are considered unacceptable.

For the WL Project a dose constraint of 0.25 mSv/a has been defined.

4.3.3 Uncertainties in the Toxicity Assessment

There are no major uncertainties and conservative assumptions used in the toxicity assessment for the closure phase.

4.4 Risk Characterization

4.4.1 Risk Estimation

For radionuclides, the total doses presented in the tables in Section 4.2.6 are compared to the public dose limit of 1 mSv/a and the dose constraint for the Project of 0.25 mSv/a. A summary of the total dose for each receptor and age group is provided in Table 4-24 along with a comparison to the public dose limit and dose constraint. The calculated radiological doses are all well below this limit, for all human receptors in the candidate critical groups.

Table 4-24: Summary of Total Dose for Closure Human Receptors and Comparison to Limits

Receptor	Age Group	Dose (mSv/a)			
		Demolition Prior to Grouting (Max)	Demolition Prior to Grouting (Avg)	Grouting (Max)	Grouting (Avg)
On-Site Worker	**Adult**	6.04E-03	1.59E-03	1.80E-04	9.76E-05
Farm F	**Adult**	3.46E-03	9.11E-04	1.01E-04	5.69E-05
	Child	3.38E-03	8.89E-04	1.21E-04	6.79E-05
	Infant (cow's milk)	2.61E-03	6.86E-04	1.59E-04	8.88E-05
	Infant (formula)	1.17E-03	3.07E-04	1.23E-04	6.72E-05
	3 month old (nursing)	1.23E-03	3.23E-04	1.09E-04	6.30E-05
	3 month old (formula)	3.96E-04	1.04E-04	8.91E-05	4.89E-05
Harvester	**Adult**	3.50E-03	9.19E-04	1.58E-05	8.82E-06
	Child	1.52E-03	4.00E-04	1.69E-05	9.40E-06
	Infant	6.66E-04	1.75E-04	1.85E-05	1.04E-05

Notes:
Shaded cells indicate exceedance of the public dose limit of 1 mSv/a and bold cells indicate exceedance of the dose constraint of 0.25 mSv/a.

4.4.2 Discussion of Chemical and Radiation Effects

4.4.2.1 Likelihood of Effects

The total radiation dose to all human receptors during closure activities is well below the public dose limit of 1 mSv/a and dose constraint for the Project of 0.25 mSv/a, as shown in Table 4-24. Since the dose estimates are a small fraction of the public dose limit, no discernable health effects are anticipated due to exposure of potential critical groups to radioactive releases from the WL site during closure.

4.4.3 Uncertainties in the Risk Characterization

The uncertainties in the characterization of risk consist of those in the exposure and toxicity assessments (Sections 4.2 and 4.3), since these two assessments are the inputs to the risk characterization.

There is inherent uncertainty in the air model used in IMPACT™ to estimate atmospheric dispersion factors to the human receptor locations. Uncertainty in the air predictions arises from the following assumptions made in the model (COG 2013):

- The activity in the plume has a normal distribution in the vertical plane.
- The effects of building-induced turbulence on the effective release height and plume spread have been generalized, while data suggest that effects of building wakes vary substantially depending upon the geometry of the buildings and their orientation with respect to wind direction.
- A given set of meteorological and release conditions leads to a unique air concentration, where in reality measured concentrations can vary by a factor of 2 under identical conditions.

At distances greater than 1 km, there is a two-fold uncertainty around the predictions of the sector-averaged Gaussian model used in IMPACT™ (COG 2013). At all distances, the Gaussian air model in IMPACT™, on average, overpredicts air concentrations by approximately a factor of 1.5 (COG 2013). Considering the conservatism in the estimation of releases, and in the air model, it is reasonable to conclude that doses arising from closure activities have not been underestimated.

The uncertainties from the exposure assessment include model uncertainty and uncertainty in the exposure factors selected. The uncertainties from the toxicity assessment include conservatisms built into the radiation dose constraint. Taken together, the approaches to exposure and toxicity assessment have ensured that the characterization of dose and risk has been undertaken in a manner that has not underestimated dose or risk.

5.0 HUMAN HEALTH RISK ASSESSMENT – POST-CLOSURE

5.1 Problem Formulation

5.1.1 Receptor Selection and Characterization

Consistent with the closure scenario and CSA N288.6-12, Nuclear Energy Workers and workers who lease businesses on-site are not addressed for the radiological assessment because their radiation exposure is monitored and their doses are controlled through CNL's Radiation Protection Program. On-site workers are not assessed during post-closure for non-radiological exposures since there is no aquatic pathway to on-site workers.

An on-site Farm was not considered reasonable for the normal evolution scenario, until after institutional control. The WRDF site will be under institutional control for the first 100 years of post-closure, which will physically restrict residential use of the site, including any farming activities. Post-institutional control, the WRDF site will be designated for commercial or industrial land use. To account for the possibility of a farm closer to WRDF, an On-site Farm receptor drinking river water has been included after institutional control.

Further evaluations of disruptive event scenarios are described in Appendix D. These include the On-site Farm receptor drinking groundwater, a WRDF barrier failure, and an exploration borehole. In the exploration borehole scenario, receptors include a driller that handles the core and nearby residents that spend time near the borehole.

Human receptors evaluated for both the radiological and non-radiological assessment for the normal evolution post-closure scenario include:

- Farm A (year-round occupants, with livestock) (located near the east bank of the Winnipeg River);
- New On-site Farm (located on the WRDF site after institutional control) and
- Harvesters.

Farm A is the most exposed critical group for releases to the Winnipeg River because liquid releases from the site travel downstream along the east bank according to the DRL report (CNL 2016b).

The new On-site Farm receptor has the same characteristics as Farm A; however, residents obtain water for drinking, irrigation, and bathing from the Winnipeg River directly downstream of the WRDF groundwater seep into the river. The On-site Farm does not have a well in normal evolution because the well capacity would not meet all the water needs of the residential family, which would therefore be more likely to use the adjacent Winnipeg River. One disruptive event scenario (Appendix D) includes the On-site Farm using well water as drinking water *only,* since the well capacity could not meet other water needs.

Harvesters represent Traditional or Indigenous users of the area who may be exposed through harvesting of country foods. It is assumed that the harvesters spend part of their time on-site, part near Farm A, and part at an unexposed upstream location. CNL (2018a) conducted an Indigenous Food Intake Survey administered by members of the Sagkeeng First Nation to understand the types and quantities of local food consumed. CNL also partnered with the Manitoba Métis Federation (MMF) to conduct Harvester food intake surveys with Manitoba Métis Citizens that harvest in the area of the WL site (Shared Value Solution. 2018). The information provided confirmed the VCs selected for the EIS and was used to validate the assumptions made for wild game, fish and plant ingestion rates for subsistent receptors. The intake rates from the MMF survey were lower than the intake rates identified by the Sagkeeng First Nation. Therefore, the Harvester receptor in the model uses the intake rates from the Sagkeeng First Nation Indigenous food intake survey. The survey results have been incorporated into the Harvester's diet and are discussed in more detail in Section 5.1.3 and 4.2.4.

Human receptors during the post-closure phase are shown on Figure 5-1.

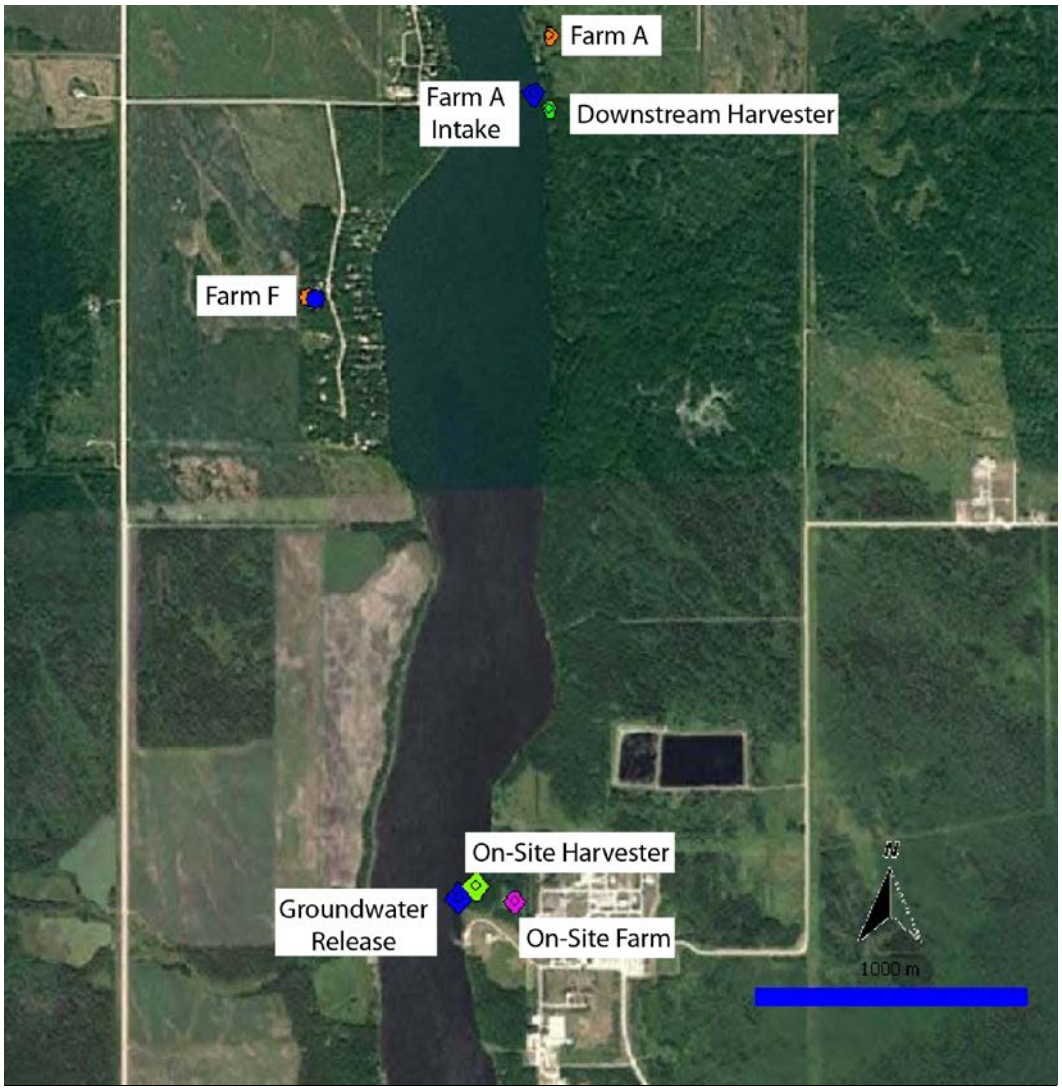


Figure 5-1: Human Receptor Locations for the Post-Closure Phase

5.1.2 Selection of Chemical, Radiological, and Other Stressors

For the post-closure phase, no atmospheric releases are expected as the grouting will be completed and the above-grade building and components will have been removed. An engineered cover will have been installed on top of the buried material. During the post-closure phase the site will be under institutional control.

The main potential release mechanism during post-closure is via leakage through the WRDF to groundwater and subsequent migration of groundwater to surface water at the Winnipeg River.

Existing concentrations (background) in surface water and sediment were included in the assessment where available. This is to evaluate cumulative effects of the Project inputs and existing conditions.

5.1.2.1 Selection of Radiological COPCs

The radionuclides that are considered in the HHRA for the post-closure phase are those radionuclides that have been identified in the source term characterization report (CNL 2020a) and assessed in the groundwater model (Section 6.3.2 of the EIS (Golder, EcoMetrix, InterGroup 2022)). The mass and activity loadings are presented in Section 3.2.1 of this report.

These radionuclides have historically been found in WL's waterborne effluent or are reasonably expected to be found in the WRDF and have the potential to migrate from groundwater to surface water during the post-closure phase. Radionuclides are considered of public and regulatory interest and therefore all radionuclides identified were carried forward quantitatively in the HHRA and did not undergo a formal screening assessment beyond what was done in the above reports.

5.1.2.2 Selection of Non-Radiological COPCs

The groundwater model predicted mass loadings (see Section 3.2) for non-radionuclides from WRDF via groundwater to the Winnipeg River for the duration of the modelling assessment timeframe (500,000 years). Maximum mass loadings for each non-radionuclide were converted to groundwater concentrations using the anticipated flowrate (Table 5-1) through the WRDF for the time period of maximum mass loadings. The flowrate through the bedrock was assumed to be equal to the flow through the backfill (Golder, 2021a).

Table 5-1: Release Time Period and Corresponding Flowrate

Time (yr)	Pathway Flow (m^3/d)
0	0.17
500	0.17
1000	0.17
2000	0.18
5000	0.19
10000 or more	0.19

Note: The flow through the bedrock was obtained from Table 4-4 in the DSAR (Golder 2021a).

The maximum predicted concentrations in groundwater at the river were compared to the following criteria to determine potential COPCs relevant to human health, in order of preference as shown in Figure 5-2:

- Health Canada Canadian Drinking Water Quality Guidelines (HC 2017);
- Manitoba Water Quality Standards, Objectives, and Guidelines (MWS 2011)
- CCME Water Quality Guidelines for Protection of Aquatic Life (CCME 1999)

- Ontario Provincial Water Quality Objectives, which are assumed by MOECC to be protective of human health (MOEE 1994);
- British Columbia Water Quality Guidelines (BC MOE 2017)

HB-40 does not have a federal or provincial drinking water quality guideline; however, Weeks (1974) derived a safe HB-40 drinking water concentration for workers of 232 mg/L, based on a minimal effect concentration of 250 mg/kg-day in mice, divided by a 100-fold safety factor. A safe HB-40 drinking water concentration for members of the public is estimated here at 8.8 mg/L based on a TRV of 0.25 mg/kg-day (250 / 1000), a drinking water intake rate of 2 L/day and body weight of approximately 70 kg.

Non-radionuclides with maximum concentrations exceeding the most conservative of these benchmarks according to the hierarchy shown in Figure 5-2 were carried forward as non-radiological COPCs in this assessment. Based on the screening shown in Table 5-2, cadmium and lead are carried forward for further quantitative assessment in the HHRA for the post-closure phase.

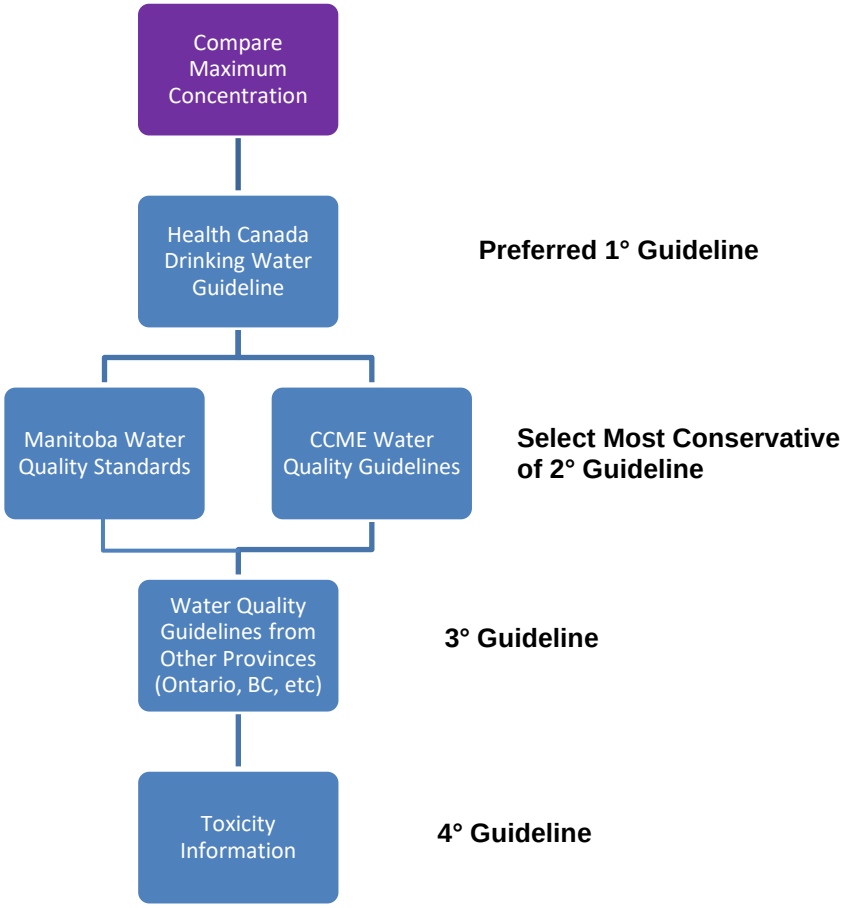


Figure 5-2: Selection Process for Human Health Screening of Non-Radiological COPCs

Table 5-2: Human Health Screening of Non-Radionuclides in Surface Water

Non-radionuclide	Groundwater Concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	CDWS MAC (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Argon	1.11E-10	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Boron	2.84E-03	1.00E+01	5000	-	1500	200	1200	-	CDWS MAC	No
Barium	2.62E-07	1.10E+01	1000	-	-	-	-	0.4	CDWS MAC	No
Bismuth	1.61E-07	<2.00E-01	-	-	-	-	-	0.25	LC_{50}/100 – Borgmann *et al.* 2005	No
Cadmium	**5.35E+00**	1.00E-02	5	0.137	0.08	0.1	0.114	-	CDWS MAC	**Yes**
Cobalt	3.05E-01	2.00E-01	-	-	-	0.9	4	-	PWQO Ontario	No
Chromium	3.49E-02	1.70E+00	50	37.1	1.0 (VI)	1 (VI)	-	-	CDWS MAC	No
Copper	7.89E-03	1.40E+01	-	4.3	2	5	2	-	CCME WQG	No
Gadolinium	1.04E-04	-	-	-	-	-	-	1.5	LC_{50}/100 – Borgmann *et al.* 2005	No
HB-40	5.84E+02	0.00E+00	8800^	-	-	-	-	-	See Note^	No
Helium	1.73E-01	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Mercury	6.00E-04	1.00E-02	1	1	0.026	0.2		-	CCME WQG	No
Potassium	4.72E-06	9.07E+02	-	-	-	-	-	5300	LCV/10 – Suter and Tsao 1996	No
Potassium hydroxide (as K)	5.37E-01	-	-	-	-	-	-	5300	LCV/10 – Suter and Tsao 1996	No
Manganese	1.20E-03	1.10E+01	None - naturally occurring	-	-	-	794.2	110	WQG BC	No
Molybdenum	1.69E-01	2.00E-01	-	-	73	40	1000	-	CCME WQG	No
Nitrogen	7.84E-03	-	1000	-	-	-	3000	-	CDWS MAC	No
Nickel	6.94E-04	1.78E+00	-	25.5	25	25	-	-	CCME WQG	No
Lead	**7.27E+01**	2.60E+00	10	0.99	1	3	4.4		CDWS MAC	**Yes**
Palladium	1.51E+00	-	-	-	-	-	-	5.7	LC_{50}/100 – Borgmann *et al.* 2005	No

Non-radionuclide	Groundwater Concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	CDWS MAC (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Ruthenium	8.87E-08	-	-	-	-	-	-	10	LC_{50}/100 – Borgmann *et al.* 2005	No
Sulphur (as SO_4)	1.14E-10	-	-	-	-	-	218000	-	WQG BC	No
Samarium	5.26E-11	-	-	-	-	-	-	0.74	LC_{50}/100 – Borgmann *et al.* 2005	No
Xenon	2.24E-08	-	-	-	-	-	-	-	Noble Gas – not applicable	NA
Xylene	6.96E+01	-	90	-	-	2/40/30 (m/o/p)	30	-	CDWS MAC	No
Zirconium	2.18E-09	-	-	-	-	4	-	-	PWQO Ontario	No

Notes:
*Noble gases were assumed to volatilize rapidly.
^Derived drinking water limit based on a minimal effect level in mice of 250 mg/kg-day (Weeks 1974), divided by 1000, times 70 kg body weight, over 2 L/day of drinking water.
Background water quality was obtained from Section 6.4.2, Table 6.4.2-5 of the EIS
CDWS = Canadian Drinking Water Standard (HC 2017)
WQSOG = Manitoba Water Quality Standards, Objectives and Guidelines (MWS 2011)
CCME WQG = Canadian Council of Ministers of the Environment Water Quality Guideline (CCME 1999)
PWQO = Ontario Provincial Water Quality Objective (MOEE 1994)
WQG BC = Water Quality Guideline British Columbia (BC MOE 2017)

5.1.3 Selection of Exposure Pathways

Exposure pathways from atmospheric release are not considered relevant during the post-closure phase, as releases to air are not expected during post-closure. During the post-closure phase groundwater releases to surface water will occur. Aquatic dispersion will carry contaminants to downstream locations on the Winnipeg River. Waterborne contaminants can partition to sediment. River water and sediment will be the primary exposure media.

Pathways relevant to exposure to releases of groundwater to surface water are presented for the human receptors in Table 5-3. For assessment of non-radiological COPCs only the ingestion pathway has been considered relevant, since the dermal pathway is considered negligible for inorganics (i.e., cadmium and lead).

During post-closure, human receptors on the On-site Farm and Farm A will be exposed via use of water from the Winnipeg River for drinking, bathing, livestock watering, and irrigation (lawns and gardens), and by ingestion of home-grown vegetables, fruit, and livestock. Ingestion of terrestrial plants and animals is included for the On-site and Farm A receptors since the Winnipeg River is used for irrigation of these plants and as drinking water for the animals. The On-site Farm does not have a well in normal evolution because the well capacity would not meet all the water needs of the residential family, which would therefore be more likely to use the adjacent Winnipeg River. Residents from the farms are also assumed to fish in the Winnipeg River.

It was noted from engagement with Indigenous communities that Sagkeeng First Nation members in the Whiteshell area harvest wild rice and medicinal plants. However, wild rice does not grow on the Winnipeg River downstream of WRDF. Nor are aquatic medicinal plants such as water lilies common on the river downstream of WRDF.

CNL (2018a) conducted an Indigenous Food Intake Survey administered by members of the Sagkeeng First Nation to understand the types and quantities of local food consumed. CNL also partnered with the Manitoba Métis Federation (MMF) to conduct Harvester food intake surveys with Manitoba Métis Citizens that harvest in the area of the WL site (Shared Value Solutions 2018). The information provided confirmed the VCs selected for the EIS and was used to validate the assumptions made for wild game, fish and plant ingestion rates for subsistent receptors. The intake rates from the MMF survey were lower than the intake rates identified by the Sagkeeng First Nation. Therefore, the Harvester receptor in the model uses the intake rates from the Sagkeeng First Nation Indigenous food intake survey.

The results indicate that survey participants consume animals such as wild game (e.g., moose, deer, rabbit and hare), waterfowl (e.g., duck and geese), fish, fruits and berries, and medicinal plants (e.g., weekay and cedar). During the post-closure phase, the focus is on aquatic pathways, since groundwater releases to surface water will occur. Since the focus is on aquatic pathways, a moose has been included instead of a deer (which was assessed during the closure phase), since a portion of the moose's diet is from ingestion of aquatic

plants. Weekay is a wetland plant and could grow along the shore of the Winnipeg River or in shallow areas. It is unlikely that weekay would be exposed to direct groundwater, but could potentially be exposed to river water.

Based on these considerations, exposure via consumption of fish and waterfowl would be the important pathways for exposure of the harvester to contaminants released from WRDF to the river. Harvesters will ingest country foods such as weekay, fish and waterfowl, as well as moose that drink from the Winnipeg River. During post-closure, aquatic release (groundwater flow to the Winnipeg River) is the relevant pathway; therefore, terrestrial pathways are not complete for the Harvester in post-closure.

There is no direct release to air; however, for volatile radionuclides (HTO, C-14, I-129), receptors will be exposed via the air pathway (inhalation and immersion) through volatilization from irrigated soil.

Table 5-3: Complete Exposure Pathways for Receptors for Exposure to Radiological and Non-Radiological COPCs during Post-Closure

Receptor	Exposure Pathway	Environmental Media
Farm A	Inhalation	Air, Dust
	Ingestion	Water (Winnipeg River) Soil/Sediment (incidental) Terrestrial plants (homegrown) Aquatic animals (fish) Terrestrial animals (beef, pork, poultry, eggs, milk, game)
	External	Air Water (Winnipeg River) Soil/Sediment
On-Site Farm (new)	Inhalation	Air, Dust
	Ingestion	Water (Winnipeg River) Soil (incidental) Terrestrial plants (homegrown) Aquatic animals (fish) Terrestrial animals (beef, pork, poultry, eggs, milk, game)
	External	Air Water (Winnipeg River) Soil/Sediment
Harvester	Inhalation	Air
	Ingestion	Riparian plants (weekay) Aquatic animals (fish) Terrestrial animals (waterfowl, moose)
	External	Air Soil/Sediment

Note:
For assessment of non-radiological COPCs the ingestion, dust inhalation, and soil dermal pathways were evaluated, following Health Canada (2010a,b). For assessment of radiological COPCs the inhalation of air (vapour) and external air pathways were evaluated, following CSA N288.1-14; only volatile radionuclides transfer from soil to air. Soil is considered to be clay as defined in the Hydrogeology Study Report (Dillon 2018).

5.1.4 Human Health Conceptual Model

The conceptual model illustrates how receptors are exposed to COPCs. It represents the relationship between the source and receptors by identifying the source of contaminants, receptor locations and the exposure pathways to be considered in the assessment for each receptor. Exposure pathways represent the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or (for radionuclides) how they may exert effects from outside the body.

The conceptual model for release to surface water from the DRL Report (CNL 2016b) is appropriate for Farm A and On-site Farm receptors during the post-closure phase and was modified slightly to represent the harvester (Figure 5-3 to Figure 5-4). These figures are consistent with the complete exposure pathways identified in Table 5-3. These figures represent the exposure pathways from source to receptor. It is appropriate for radiological and non-radiological COPCs, except that, for non-radionuclides, external pathways are not applicable.

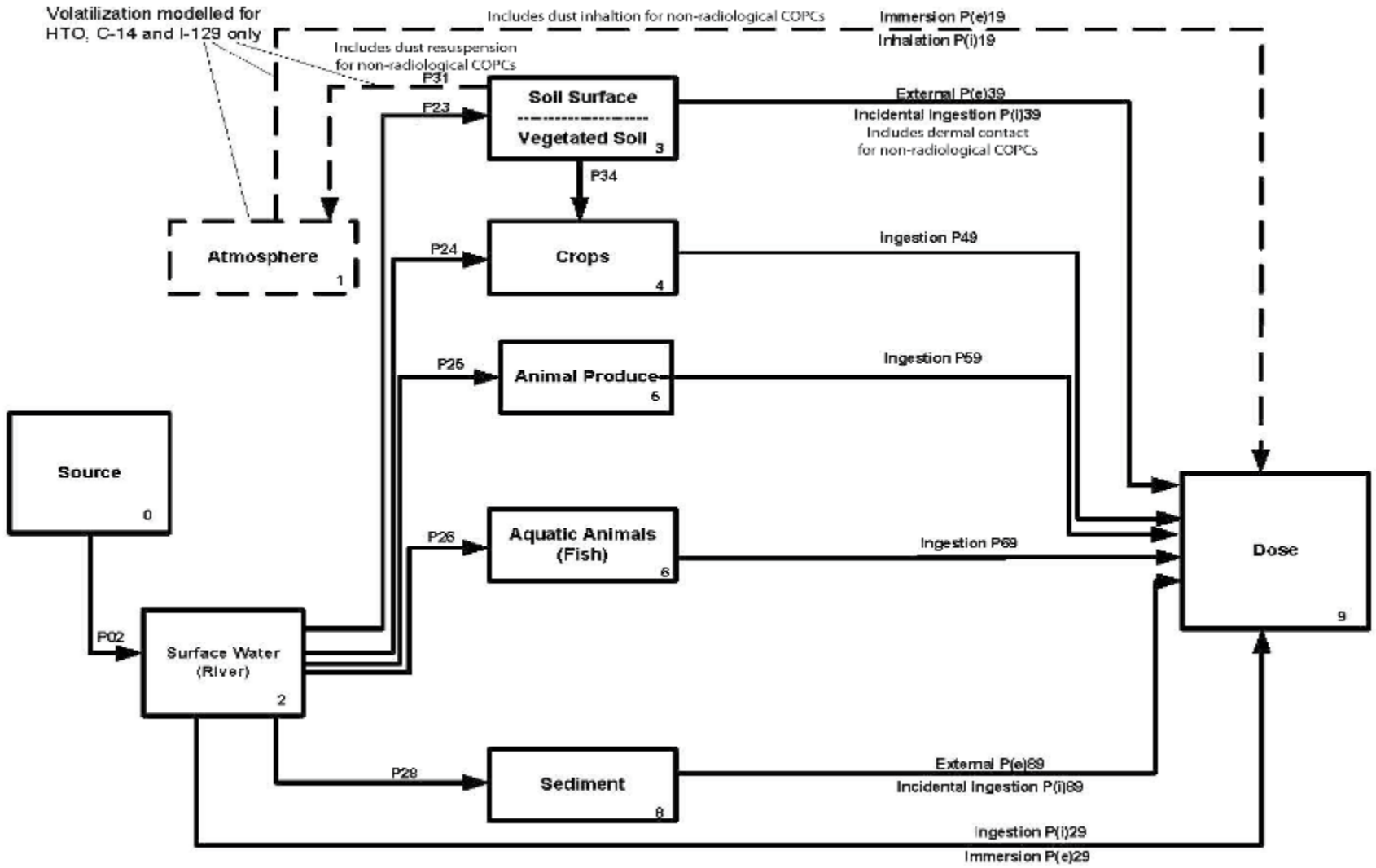
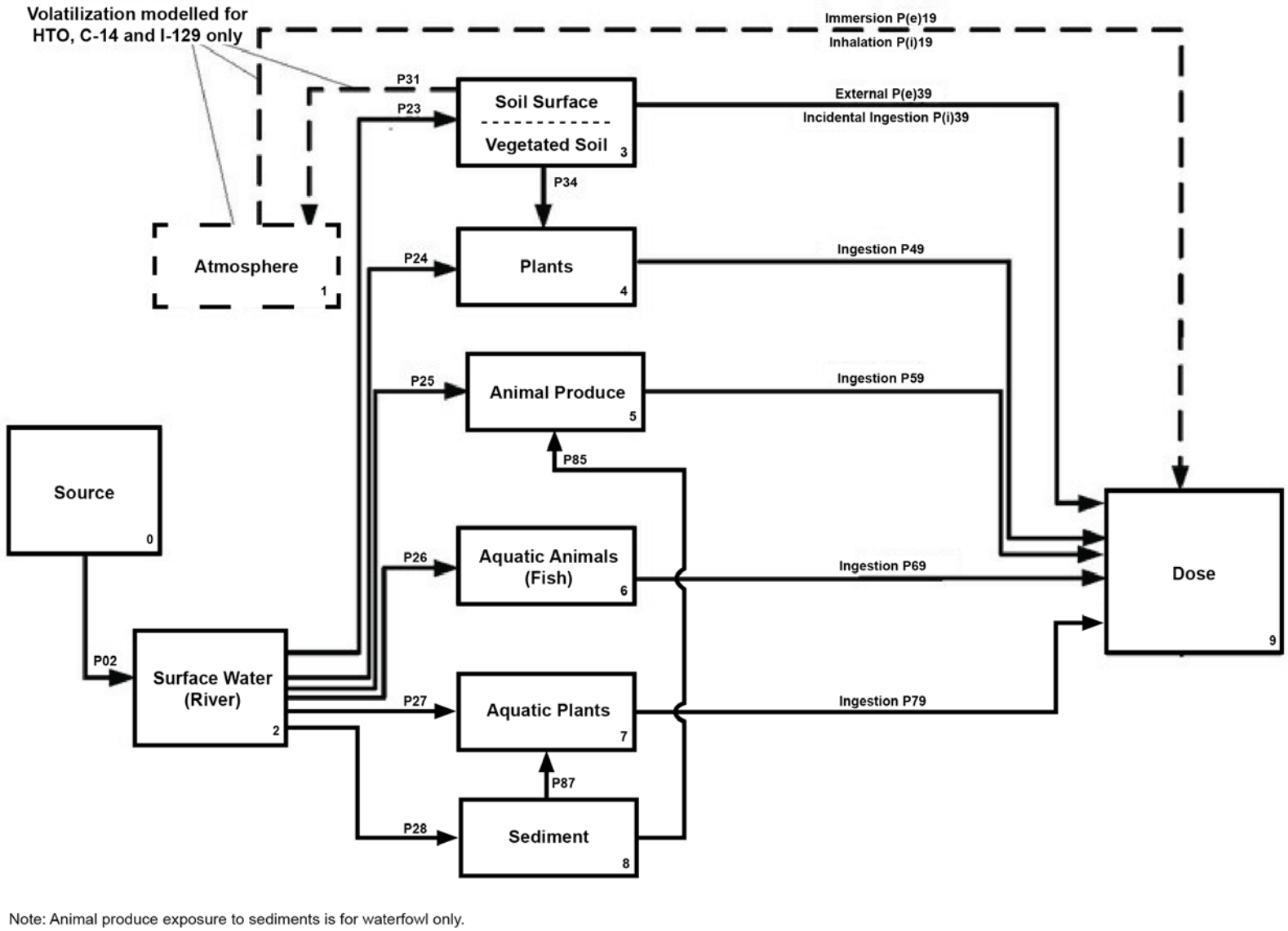


Figure 5-3: Conceptual Model for Farm A and On-site Farm during the Post-Closure Phase



Note: Animal produce exposure to sediments is for waterfowl only.

Figure 5-4: Conceptual Model for Harvester during the Post-Closure Phase

5.1.5 Uncertainty in Problem Formulation

The HHRA problem formulation is conservative in its assumptions to accommodate uncertainties and meet the objective of protecting human health during the post-closure phase.

Maximum predicted concentrations from the 500,000 year modelling timeframe, and the extended modelling timeframe for those COPCs that did not reach their peak before 500,000 years, were selected for COPC screening in groundwater and surface water; this is considered conservative and is not reflective of typical human exposures. The human health screening benchmarks for water were generally the lower of applicable provincial and federal drinking water standards and guidelines, which is a conservative approach, ensuring that the list of COPCs would be as comprehensive as possible. The conceptual model for human health is considered to be complete for the majority of general public exposures in the vicinity of the WL site. The selected receptors are expected to lead to conservative estimates of health risks. The selected exposure pathways are consistent with available guidance (for example, N288.1-14), and are expected to account for all significant exposure pathways for human receptors in the area.

The Harvester's diet is based on engagement with Indigenous communities; however, it represents what is available near the WR-1 at this time; therefore, wild rice was not included in the Harvester's diet as the waters near WL do not support wild rice. There is uncertainty around the Harvester's diet far into the future based on possible changes to what is available and can grow near WL; however, the diet has been developed based on the best available information at this time. Consumption of weekay has been included in the Harvester's diet which can provide a general indication of the dose from ingestion of wild rice.

There are uncertainties in the predicted radiological and non-radiological release rates to the groundwater; however, the estimates are expected to be appropriate as they are based on best available information on existing inventory of radiological and non-radiological contaminants in WRDF, as discussed in Section 3.1. There are inherent uncertainties in the models used to predict mass loadings to the environment (MODFLOW and GoldSim®). These uncertainties are described in detail in Section 6.3.2 of the EIS and related Appendices. The groundwater model incorporates conservative assumptions resulting in conservative mass loadings. For example, no solute partitioning was applied for C-14 in the bedrock migration path; therefore, no retardation of C-14 has been assumed. Additionally, the groundwater model assumes that grout fails and allows for the solute mass to exist anywhere within the grout block. This is conservative as the grout would have a high capacity for adsorption of carbon due to the presence of calcium minerals.

5.2 Exposure Assessment

5.2.1 Exposure Locations

The exposure location is the location where the receptor comes into contact with the COPC or stressor. For both the radiological and non-radiological exposure assessment the relevant human receptors are Farm A, On-site Farm, and a local harvester, as discussed in Section 5.1.1. Table 5-4 and Figure 5-1 present the locations of these receptors. The easting and northing for each receptor is presented.

Table 5-4: Location of Human Receptors for Post-Closure Phase

Potential Critical Group	Easting (m)	Northing (m)
Farm A (river water intake)	709599	5565468
On-site Farm (New)	709523	5562492
Harvester (On-Site)	709379	5562548
Harvester (near Farm A)	709649	5565412

5.2.2 Exposure Duration and Frequency

Full-time residency was assumed for the residents of Farm A and On-site Farm. The harvester was assumed to be harvesting on the WL site for 2 hours per week, downstream in the vicinity of Farm A for 2 hours per week, and upstream for 2 hours per week. For Farm A and the On-site Farm, the percentage of food items in the diet that are obtained from local sources was consistent with the DRL report (CNL 2016b). For the harvester, the local percentage of food intake was assumed to be 33% (fish, duck, moose, and weekay) since the harvester only spends 33% of harvesting time at each harvest location (Table 5-5).

For Farm A and the On-site Farm, all water for drinking, irrigation, bathing, and animal drinking is obtained from the Winnipeg River. The harvester does not consume water, but the animals that are harvested obtain their drinking water from the Winnipeg River.

Table 5-5: Percentage of Food from Local Sources During the Post-Closure Phase

Receptor	Terrestrial Animal Products[2]										Plant Products[2]					Fish
	Beef[3]	Pork	Poultry	Venison	Moose	Rabbit	Duck	Eggs	Milk	Honey	Medicinal Plants[4]	Fruit	Above-Ground Vegetables	Potatoes	Grain	
Farm A/ On-site Farm (new)	50	50	100	100	0	0	0	100	100	0	0	15	25	100	0	30
Harvester[1]	0	0	0	0	33	0	33	0	0	0	33	0	0	0	0	33

Note:
1. Harvester spends 33% of the time on-site, 33% of the time harvesting near Farm A, and 33% of the time in an unexposed location.
2. The zero percentages indicate foods that are not obtained locally for the receptor, i.e., the pathway is incomplete.
3. Includes beef and beef offal.
4. The harvester consumes weekay as a medicinal plant.

5.2.3 Exposure and Dose Calculations

5.2.3.1 Radiological Dose Calculations

Equations used to derive radiological dose via inhalation, air immersion, groundshine, soil/sediment ingestion, water immersion, water ingestion, and food ingestion are from CSA N288.1-14 (2014) and are presented in Section 4.2.3.1. Releases from groundwater to surface water were modelled over a 40-year period, consistent with assumptions in CSA N288.1-14 (2014) allowing for buildup of radionuclides in soil from irrigation. Additionally, this is a reasonable timeframe for the life of a garden.

5.2.3.2 Non-Radiological Dose Calculations

The ingestion dose from exposure to cadmium and lead in drinking water and soil was calculated according to the following equation, consistent with CSA N288.6-12 (CSA 2012):

$$\text{Dose (mg/kg-d)} = C \bullet IR \bullet RAF_{GIT} \bullet D_2 \bullet D_3 \bullet D_4 / (BW \bullet LE)$$

where,

C	=	concentration of contaminant in drinking water or soil (mg/L or mg/kg dw)
IR	=	receptor intake rate (L/d or kg/d)
RAF_{GIT}	=	relative absorption factor for the gastrointestinal tract (unitless)
D_2	=	days per week exposed•(7 days)$^{-1}$ (d/d)
D_3	=	weeks per year exposed•(52 weeks)$^{-1}$ (wk/wk)
D_4	=	total years exposed to site (years) (for carcinogens only)
BW	=	body weight (kg)
LE	=	life expectancy (years) (for carcinogens only).

The ingestion dose from exposure to cadmium and lead in food items was calculated according to the following equation, consistent with CSA N288.6-12 (CSA 2012):

$$\text{Dose (mg/kg-d)} = [\Sigma\ (C_{food\ i} \bullet IR_{food\ i} \bullet RAF_{GITi} \bullet D_i)] \bullet D_4 / (BW \bullet 365 \bullet LE)$$

where,

C_{foodi}	=	concentration of contaminant in food i (mg/kg)
IR_{foodi}	=	receptor ingestion rate for food i (kg/d)
RAF_{GITi}	=	relative absorption factor for the gastrointestinal tract for contaminant i (unitless)
D_i	=	days per year during which consumption of food i will occur (d/a)
D_4	=	total years exposed to site (years) (for carcinogens only)
BW	=	body weight (kg)
365	=	total days per year (constant) (d/a)
LE	=	life expectancy (years) (for carcinogens only)

The soil contact dose from exposure to cadmium and lead in soil was calculated according to the following equation (HC 2010b):

$$\text{Dose (mg/kg-d)} = [((C \bullet SA_H \bullet SL_H) + (C \bullet SA_O \bullet SL_O)) \bullet RAF_{DERM} \bullet D_2 \bullet D_3 \bullet D_4]/[BW \bullet LE]$$

where,

C	=	concentration of contaminant in soil (mg/kg dw)
SA_H	=	surface area of hands exposed for soil loading (cm^2)
SA_o	=	surface area exposed other than hands (cm^2)
SL_H	=	soil loading rate to exposed skin of hands (kg/cm^2-event)
SL_O	=	soil loading rate to exposed skin other than hands (kg/cm^2-event)
RAF_{DERM}	=	relative absorption factor for the gastrointestinal tract (unitless)
D_2	=	days per week exposed•$(7 \text{ days})^{-1}$ (d/d)
D_3	=	weeks per year exposed•$(52 \text{ weeks})^{-1}$ (wk/wk)
D_4	=	total years exposed to site (years) (for carcinogens only)
BW	=	body weight (kg)
LE	=	life expectancy (years) (for carcinogens only).

The soil particulate inhalation dose from exposure to cadmium and lead in soil was calculated according to the following equation (HC 2010b):

$$\text{Dose (mg/kg-d)} = [C \bullet P_{AIR} \bullet RAF_{INH} \bullet IR_{INH} D_1 \bullet D_2 \bullet D_4]/[BW \bullet LE]$$

where,

C	=	concentration of contaminant in soil (mg/kg dw)
P_{AIR}	=	particulate concentration in air (kg/m^3)
RAF_{INH}	=	relative absorption factor for inhalation (unitless)
IR_{INH}	=	receptor inhalation rate (m^3/day)
D_1	=	hours per day days exposed•$(24 \text{ hours})^{-1}$ (hr/hr)
D_2	=	days per week exposed•$(7 \text{ days})^{-1}$ (d/d)
D_3	=	weeks per year exposed•$(52 \text{ weeks})^{-1}$ (wk/wk)
D_4	=	total years exposed to site (years) (for carcinogens only)
BW	=	body weight (kg)
LE	=	life expectancy (years) (for carcinogens only).

Cadmium is considered a carcinogen for inhalation, but not for other pathways. No other COPCs are carcinogens. To estimate the on-site soil concentrations during post-closure for non-radiological COPCs, the soil model as per CSA N288.1-14 (2014) was used. The soil model factors in irrigation rates as well as loss rates due to erosion, volatilization, and leaching.

5.2.4 Exposure Factors

For the radiological dose calculations, the dose coefficients used are the progeny-inclusive dose coefficients from Annex C of N288.1-14. The exposure factors (e.g., intake rates,

occupancy and shielding factors, etc.) are generally those used in N288.1-14 (CSA 2014). Refer to Section 4.2.4 for more information

The intake rates for ingestion and inhalation are the mean intake rates provided in Table G.9b in N288.1-14 (CSA 2014). Consistent with N288.1-14 (CSA 2014), three age classes were evaluated: infant (1 year old), child (10 year old), and adult. A 3 month old was included as well, to represent a nursing and formula-fed infant. The mean intake rates for the 3 month old were obtained from the COG DRL Guidance Document (COG 2013). The 3 month old is assumed to be exclusively fed through breast milk or formula, and does not eat other food. The ingestion rate for breast milk is 985 g fw/d. The ingestion rate for water consumed in formula is the drinking water intake rate (132 L/a) since that rate for infants includes water used to make formula.

Relevant intake rates and other exposure factors used in the human dose calculations for Farm A and the On-site Farm are provided in Table 4-5 along with the appropriate reference. Internal organs such as the liver are included in the “Beef Offal” food type.

The harvester has different aquatic and terrestrial animal ingestion rates based on a different type of diet. The specific ingestion rates for the harvester are provided in Table 4-6 and are based on the Indigenous Food Intake Survey (CNL 2018a).

CNL also partnered with the Manitoba Métis Federation (MMF) to conduct Harvester food intake surveys with Manitoba Métis Citizens that harvest in the area of the WL site (Shared Value Solutions 2018). The information provided confirmed the VCs selected for the EIS and was used to validate the assumptions made for wild game, fish and plant ingestion rates for subsistent receptors. The intake rates from the MMF survey were lower than the intake rates identified by the Sagkeeng First Nation. Therefore, the Harvester receptor in the model uses the intake rates from the Sagkeeng First Nation Indigenous food intake survey.

For non-radiological dose calculations, exposure factors are generally those from Health Canada Preliminary Quantitative Risk Assessment guidance (2004, 2010a), as recommended by Clause 6.3.5 of CSA N288.6-12 (2012). Table 5-7 and Table 5-8 summarize the exposure. The particulate concentration in air was assumed to be 0.76 µg/m^3 (HC 2010a). Relative absorption factors for inhalation and ingestion pathways were 1, whereas for dermal pathways this factor was 0.01 for cadmium and 0.1 for lead (HC 2010b).

For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6. The order of preference for exposure factors for cadmium and lead was IAEA (2010), Sheppard et al (2010), and then a surrogate approach.

Table 5-6: Identification of Appropriate Surrogates for Exposure Factors

Element	Surrogate Element
Actinium	Lanthanum
Bismuth	Antimony
Calcium	Strontium
Lead	Tin
Polonium	Tellurium
Cadmium	Zinc

Table 5-7: Farmer Exposure Factors for Non-Radiological Dose Calculations

Receptor Characteristic	Toddler	Child	Adult (Male)	Source
Age (years)	7 months to 4 years	5 to 11	20+	Health Canada 1994 (as cited in HC 2010a)
Body Weight (kg)	16.5	32.9	70.7	Richardson 1997 (as cited in HC 2010a)
Drinking water ingestion rate (L/day)	0.6	0.8	1.5	Richardson 1997 (as cited in HC 2010a)
Soil Ingestion Rate (kg/day)	0.00008	0.00002	0.00002	HC 2010a
Inhalation Rate (m^3/day)	8.3	14.5	16.6	Allan *et al*. 2008 2009 (as cited in HC 2010a)
Hands SA (cm^2)	430	590	890	Richardson 1997 (as cited in HC 2010a)
Arms SA (cm^2)	890	1480	2500	Richardson 1997 (as cited in HC 2010a)
Hands soil loading (kg/cm^2/event)	1.00E-07	1.00E-07	1.00E-07	Kissel *et al*. 1996 (as cited in HC 2010a)
Inhalation Rate (m^3/day)	8.3	14.5	16.6	Allan *et al*. 2008 2009 (as cited in HC 2010a)
Food ingestion Rate of Plants (kg/day)	0.396	0.907	1.206	CSA 2014 (Table 9b)
Food Ingestion Rate of Homegrown Fruits, Garden Vegetables, and Potatoes (kg/day)	0.064	0.169	0.26	FIR adjusted by the intake fraction x local fraction: 16.12%, 18.61%, and 21.54% for toddler, child, adult, respectively
Food Ingestion Rate of Fish (kg/day)	0.0014	0.00396	0.00564	CSA 2014 (Table 9b) x intake fraction x local fraction of 0.3
Food Ingestion Rate of Meat (kg/day)	0.72	0.784	0.7	CSA 2014 (Table 9b)
Food Ingestion Rate of Beef (kg/day)	0.006	0.018	0.063	FIR adjusted by the intake fraction x local fraction: 0.84%, 2.29%, and 8.96% for toddler, child, adult, respectively
Food Ingestion Rate of Poultry (kg/day)	0.02	0.06	0.11	FIR adjusted by the intake fraction x local fraction: 3.15%, 7.64%, and 15.21% for toddler, child, adult, respectively
Food Ingestion Rate of Pork (kg/day)	0.005	0.014	0.027	FIR adjusted by the intake fraction x local fraction: 0.67%, 1.82%, and 3.88% for toddler, child, adult, respectively
Food Ingestion Rate of Eggs (kg/day)	0.006	0.022	0.053	FIR adjusted by the intake fraction x local fraction: 0.81%, 2.82%, and 7.53% for toddler, child, adult, respectively

Receptor Characteristic	Toddler	Child	Adult (Male)	Source
Food Ingestion Rate of Milk (kg/day)	0.67	0.62	0.34	FIR adjusted by the intake fraction x local fraction: 92.54%, 79.69%, and 49.16% for toddler, child, adult, respectively
Food Ingestion Rate of Deer (kg/day)	0	0.00008	0.00028	FIR adjusted by the intake fraction x local fraction: 0.00%, 0.01%, and 0.04% for toddler, child, adult, respectively
Hours per day on-site /24 hours (D_1)	24	24	24	Assumed
Days per week on-site (D_2)/7 days	7	7	7	Assumed
Weeks per year on-site (D_3)/52 weeks	52	52	52	Assumed
Total Years Exposed (D_4)	4.5	6	60	Based on 80 year life, HC 2010a
Days per year for food ingestion (D_i)	365	365	365	HC 2010a

Note:
The Food Ingestion Rates (FIR) are from Table 4-5 and are shown here after adjusting for the intake fraction and local fraction

Table 5-8: Harvester Exposure Factors for Non-Radiological Dose Calculations

Receptor Characteristic	Toddler	Child	Adult (Male)	Source
Age (years)	7 months to 4 years	5 to 11	20+	Health Canada 1994 (as cited in HC 2010a)
Body weight (kg)	16.5	32.9	70.7	Richardson 1997 (as cited in HC 2010a)
Food Ingestion Rate of Fish (kg/day) (IR_{Fi})	2.58E-03	7.40E-03	1.05E-02	FIR adjusted by the intake fraction x local fraction: 33%
Food Ingestion Rate of Wild Waterfowl (kg/day) (IR_{Fi})	2.08E-04	6.17E-04	1.38E-03	FIR adjusted by the intake fraction x local fraction: 5.34%
Food Ingestion of Weekay (kg/day)	5.38E-04	1.23E-03	1.64E-03	FIR adjusted by the intake fraction x local fraction: 2.47%
Food Ingestion Rate of Moose (kg/day)	7.35E-04	2.18E-03	4.88E-03	FIR adjusted by the intake fraction x local fraction: 18.9%
Days per year for food ingestion (D_i)	122	122	122	Assumed

Note:
The Food Ingestion Rates (FIR) are from Table 4-6and are shown here after adjusting for the intake fraction and local fraction. Deer has been replaced with moose for the Harvester during the post-closure phase.

5.2.5 Dispersion Models

5.2.5.1 Aquatic Dispersion – River Model

The concentration of COPCs in water is determined by the release rate and the transfer parameter (P_{02} in s/L) from the source to the Winnipeg River. The river model from Clause 7.1.4 in CSA N288.1-14 is shown in the equation below.

$$P_{02}(x,y) = \frac{1}{2 \bullet \pi \bullet d \bullet \sqrt{k_x \bullet k_y}} \bullet \exp\left[\frac{U_x \bullet x}{2 \bullet k_x} - \lambda_s \bullet \frac{x}{U_x}\right] \bullet \exp\left[-\lambda_r \bullet \frac{x}{U_x}\right] \bullet K_o\left[\frac{U_x}{2 \bullet k_x} \bullet \sqrt{x^2 + \frac{k_x}{k_y} \bullet (y - y_o)^2}\right]$$

where

d = average water depth between the release point and the receptor (m)
k_x = longitudinal dispersion coefficient ($m^2 \bullet s^{-1}$)
k_y = lateral dispersion coefficient ($m^2 \bullet s^{-1}$)
U_x = current velocity ($m \bullet s^{-1}$)
x = downstream distance between the source and the point (x,y) (m)
λ_s = removal constant for sedimentation (s^{-1})
λ_r = radioactive decay constant (s^{-1})
K_o = modified Bessel function of the second kind
y = offshore distance coordinate for the point (x,y) (m)
y_o = offshore distance to the plume centreline (m)

The main input parameters used in the river model are provided in Table 5-9. The complete set of parameters are provided in Section 6.4.2 of the EIS.

Table 5-9: Input Parameters for the River Model during Post-Closure

Parameter	Units	Value	Reference
Longitudinal Dispersion Coefficient	m^2/s	150	CNL 2016b
Lateral Dispersion Coefficient	m^2/s	0.129	Calculated (equation F-3b in CSA N288.1-14)
River Depth	M	0.1 and 7.7	CNL 2016b (On-site Farm and Farm A water intakes)
River Width	M	470	CNL 2016b
Flow rate	m^3/s	1,014	1987 to 2014 average at McArthur Dam (WSC 2016)
Current Velocity	m/s	0.3	Flow rate/(River width x River Depth)

5.2.5.2 Partitioning from Water to Other Media

From the modelled COPC concentrations in water at any location, the IMPACT™ model also calculates COPC partitioning to sediment and aquatic organisms, such as fish, and the

transfer from water to soil by irrigation. The pathways are illustrated in Figure 5-3 and Figure 5-4. The equations are described in CSA N288.1 (2014).

For transfer from surface water to sediment, the surface water concentration of a COPC was multiplied by its sediment water partition coefficient as defined in CSA N288.1 (2014). This approach assumes sediments and water are in equilibrium, and that sediments are depositional and will accumulate COPCs. As the Winnipeg River is erosional, with a hard clay bottom strewn with sand, gravel, cobble, and boulders (AECL 2001b), it is likely that this model overestimates concentrations in sediment.

5.2.6 Exposure Point Concentrations and Doses

The concentration of radionuclides and non-radionuclides in surface water was determined at 50 m and 3,150 m downstream from the upstream edge of the groundwater seep. These locations correspond to on-site and Farm A.

For the harvester, the only relevant pathways during post-closure are the aquatic and terrestrial animal ingestion pathways, as well as the medicinal plant (weekay) ingestion pathway.

The groundwater release intercepts the Winnipeg River over a distance of approximately 95 m extending along the shoreline of the river. This is represented in IMPACT™ by a series of point sources (five) evenly spaced along the groundwater intercept with the shoreline to approximate a line source. The mass loading is distributed evenly among the series of point sources.

5.2.6.1 Radiological Exposure Concentrations and Doses

The radiological release rates, receptor characteristics, and the exposure factors detailed in the previous sections, were used as inputs into the IMPACT™ model to predict the radiological doses to human receptors during the post-closure phase.

Sediment near the WL effluent outfall has elevated levels of Cs-137 due to historical discharge and fallout (AECL 2001a). Therefore, existing Cs-137 concentrations, based on routine monitoring at the WL site of river bottom sediments, were added into the model to represent the cumulative effects of Project inputs and existing conditions. The 90th percentile of Cs-137 sediment data from 2010 to 2018 was used (2019 data were not used as all data were below an elevated detection limit), from the nearfield at the outfall (location OFL) and from the farfield near Farm A (location K14), at 323 and 34 Bq/kg (dw), respectively (CNL 2020b, 2019a, 2016c). See Section 6.4.2 of the EIS for more details on sediment quality.

The radiological doses to all human receptors identified are presented for the post-closure phase for maximum release to surface water scenarios (see Table 5-10 through Table 5-14). Doses are generally presented for three age groups: adult, child, and infant (1 year old). Doses are also presented for a 3 month old nursing infant versus a 3 month old

formula fed infant. The doses are based on media concentrations reached after 40 years of aquatic release at the time of maximum discharge from groundwater. Sample calculations are presented in Appendix C.

The characteristics of the On-site Farm, Farm A, and Farm F are the same except for their locations (see Figure 5-1). Radiological doses presented for Farm A are considered bounding for Farm F, as previous work has shown that the discharge from the active WR-1 hugged the east side of the river, and that radiological doses to residents at Farm A would be higher than at Farm F (CNL 2016b); therefore, radiological doses are presented only for the On-site Farm and Farm A.

The doses presented for each radionuclide represent the time of maximum release, as indicated in Table 3-16.

Table 5-10: Estimated Radiation Dose for Harvester during Post-Closure – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-14	5.76E-16	0.00E+00	3.56E-16	2.06E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.35E-13	2.73E-14	0.00E+00	1.69E-14	9.79E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-16	2.47E-15	0.00E+00	3.55E-16	2.94E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-14	2.21E-13	0.00E+00	3.67E-15	2.55E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-06	1.33E-05	0.00E+00	1.42E-05	2.96E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-12	8.18E-14	0.00E+00	1.13E-13	2.55E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-15	2.70E-14	0.00E+00	2.98E-14	6.13E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	1.74E-05
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-19	7.43E-21	0.00E+00	1.51E-20	2.15E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-09	1.49E-08	0.00E+00	1.10E-08	2.82E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-11	2.73E-11	0.00E+00	1.69E-11	9.44E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-25	9.98E-25	0.00E+00	2.92E-29	1.62E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-12	7.06E-12	0.00E+00	1.01E-12	1.08E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-10	1.94E-11	0.00E+00	2.35E-12	2.13E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.83E-10	6.40E-09	0.00E+00	1.71E-09	8.89E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-14	1.18E-14	0.00E+00	3.97E-17	6.67E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-16	6.83E-17	0.00E+00	2.29E-19	3.87E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-12	2.38E-10	0.00E+00	1.46E-12	2.41E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-07	2.16E-07	0.00E+00	4.83E-08	3.65E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-09	1.26E-07	0.00E+00	8.43E-13	1.30E-07
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-12	3.05E-10	0.00E+00	2.04E-15	3.14E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-13	1.12E-14	0.00E+00	3.13E-14	5.64E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-18	4.51E-20	0.00E+00	1.26E-19	2.28E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-13	5.42E-15	0.00E+00	1.52E-14	2.74E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-12	2.96E-14	0.00E+00	8.37E-14	1.50E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-17	4.80E-19	0.00E+00	1.35E-18	2.43E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.37E-13	5.69E-12	0.00E+00	6.60E-14	6.09E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E-15	1.61E-16	0.00E+00	1.14E-16	9.48E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-19	1.63E-20	0.00E+00	1.16E-20	9.59E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-13	8.86E-15	0.00E+00	6.30E-15	5.21E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-13	7.29E-15	0.00E+00	5.18E-15	4.29E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-16	8.13E-18	0.00E+00	5.76E-18	4.78E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-18	5.19E-20	0.00E+00	3.69E-20	3.05E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-14	5.63E-16	0.00E+00	3.99E-16	3.31E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-12	2.14E-14	0.00E+00	4.16E-13	4.25E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-11	6.46E-14	0.00E+00	1.26E-12	1.28E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-12	2.53E-14	0.00E+00	4.92E-13	5.02E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-12	3.40E-14	0.00E+00	6.63E-13	6.77E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-11	1.67E-13	0.00E+00	3.26E-12	3.32E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.25E-06**	**1.36E-05**	**0.00E+00**	**3.17E-05**	**4.75E-05**
Child-10y-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-14	9.10E-16	0.00E+00	3.59E-16	3.46E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-13	2.62E-14	0.00E+00	1.03E-14	9.96E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-16	3.25E-15	0.00E+00	2.97E-16	3.71E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-14	3.47E-13	0.00E+00	3.66E-15	4.01E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-06	1.29E-05	0.00E+00	8.76E-06	2.38E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-12	1.45E-13	0.00E+00	1.27E-13	4.75E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-15	3.88E-14	0.00E+00	2.72E-14	7.29E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-06	5.99E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-19	6.75E-21	0.00E+00	8.73E-21	2.03E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-09	1.31E-08	0.00E+00	6.13E-09	2.14E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-11	3.31E-11	0.00E+00	1.30E-11	1.11E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.35E-25	1.40E-24	0.00E+00	2.61E-29	2.34E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-12	8.67E-12	0.00E+00	7.88E-13	1.30E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-10	1.37E-11	0.00E+00	1.05E-12	1.59E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-10	6.16E-09	0.00E+00	1.04E-09	8.01E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-14	1.07E-14	0.00E+00	2.30E-17	6.42E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-16	1.05E-16	0.00E+00	2.23E-19	6.29E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-12	4.61E-10	0.00E+00	1.80E-12	4.65E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-07	3.29E-07	0.00E+00	4.68E-08	5.40E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.04E-09	9.58E-08	0.00E+00	4.07E-13	9.89E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-12	2.32E-10	0.00E+00	9.85E-16	2.39E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-12	3.53E-14	0.00E+00	6.30E-14	1.86E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-18	1.27E-19	0.00E+00	2.25E-19	6.69E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.63E-13	1.92E-14	0.00E+00	3.44E-14	1.02E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-12	5.94E-14	0.00E+00	1.07E-13	3.14E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-17	1.91E-18	0.00E+00	3.43E-18	1.01E-16
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-13	8.12E-12	0.00E+00	6.00E-14	8.70E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-14	2.96E-16	0.00E+00	1.34E-16	1.85E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-18	2.39E-20	0.00E+00	1.08E-20	1.49E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-13	7.87E-15	0.00E+00	3.57E-15	4.93E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-13	5.85E-15	0.00E+00	2.65E-15	3.66E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-16	1.24E-17	0.00E+00	5.60E-18	7.78E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-18	4.59E-20	0.00E+00	2.08E-20	2.87E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-14	8.60E-16	0.00E+00	3.89E-16	5.38E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-12	2.29E-14	0.00E+00	2.84E-13	4.69E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-11	6.85E-14	0.00E+00	8.49E-13	1.40E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-12	2.68E-14	0.00E+00	3.32E-13	5.48E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-12	3.56E-14	0.00E+00	4.42E-13	7.28E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-11	1.78E-13	0.00E+00	2.20E-12	3.63E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.39E-06**	**1.33E-05**	**0.00E+00**	**1.48E-05**	**3.05E-05**
Infant_1y-Havester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.86E-14	1.06E-15	0.00E+00	4.02E-16	5.00E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.65E-13	1.88E-14	0.00E+00	7.17E-15	8.91E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-16	2.89E-15	0.00E+00	2.55E-16	3.33E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.31E-14	4.04E-13	0.00E+00	4.12E-15	4.82E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-06	8.96E-06	0.00E+00	5.90E-06	1.68E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-12	5.48E-14	0.00E+00	4.64E-14	2.22E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-15	4.48E-14	0.00E+00	3.04E-14	8.51E-14

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-06	2.42E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-19	5.32E-21	0.00E+00	6.65E-21	1.97E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-09	9.67E-09	0.00E+00	4.37E-09	1.61E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-11	1.33E-11	0.00E+00	5.08E-12	5.14E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-24	1.39E-24	0.00E+00	2.51E-29	2.56E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-12	9.33E-12	0.00E+00	8.20E-13	1.50E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-10	9.08E-12	0.00E+00	6.76E-13	1.30E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.27E-10	4.43E-09	0.00E+00	7.25E-10	5.88E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-14	5.27E-15	0.00E+00	1.10E-17	3.83E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.46E-16	1.19E-16	0.00E+00	2.45E-19	8.66E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-12	3.04E-10	0.00E+00	1.15E-12	3.07E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-07	3.87E-07	0.00E+00	5.33E-08	6.83E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-09	5.19E-08	0.00E+00	2.13E-13	5.40E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-12	1.26E-10	0.00E+00	5.16E-16	1.31E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-12	3.00E-14	0.00E+00	5.18E-14	1.97E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.03E-18	1.12E-19	0.00E+00	1.93E-19	7.33E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-12	1.61E-14	0.00E+00	2.78E-14	1.05E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-12	2.48E-14	0.00E+00	4.32E-14	1.62E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-17	9.71E-19	0.00E+00	1.68E-18	6.35E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-13	1.04E-11	0.00E+00	7.46E-14	1.13E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-14	3.14E-16	0.00E+00	1.37E-16	2.45E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-18	2.05E-20	0.00E+00	8.97E-21	1.60E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-13	4.42E-15	0.00E+00	1.93E-15	3.45E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-13	3.48E-15	0.00E+00	1.52E-15	2.72E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-15	1.46E-17	0.00E+00	6.37E-18	1.14E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-18	2.48E-20	0.00E+00	1.09E-20	1.94E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-14	1.01E-15	0.00E+00	4.42E-16	7.90E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-12	1.43E-14	0.00E+00	1.72E-13	3.62E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-11	4.19E-14	0.00E+00	5.02E-13	1.06E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-12	1.71E-14	0.00E+00	2.05E-13	4.31E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.52E-12	2.30E-14	0.00E+00	2.76E-13	5.82E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-11	1.09E-13	0.00E+00	1.31E-12	2.75E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.19E-06**	**9.41E-06**	**0.00E+00**	**8.37E-06**	**2.00E-05**

Table 5-11: Estimated Radiation Dose for New On-site Farm during Post-Closure – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	3.72E-15	1.47E-17	2.59E-22	1.13E-17	3.00E-18	5.25E-16	0.00E+00	3.03E-16	5.02E-17	6.25E-17	4.69E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.76E-13	3.09E-19	6.29E-18	9.11E-15	1.42E-16	9.96E-16	0.00E+00	1.43E-14	8.71E-15	6.23E-15	2.16E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.18E-15	6.92E-16	1.16E-19	3.37E-13	9.81E-17	1.43E-12	0.00E+00	1.30E-15	8.71E-16	1.75E-15	1.77E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.80E-13	5.70E-16	2.03E-20	1.26E-15	1.38E-15	2.89E-14	0.00E+00	1.16E-13	4.54E-16	1.26E-14	7.42E-13
	C-14	mSv/a	7.49E-12	8.61E-15	2.26E-07	4.79E-12	2.71E-14	1.36E-12	5.35E-12	2.85E-12	0.00E+00	6.97E-06	2.87E-06	3.64E-05	4.65E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	3.96E-12	0.00E+00	1.76E-16	0.00E+00	3.57E-16	0.00E+00	0.00E+00	4.30E-14	5.75E-12	2.49E-12	1.22E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	5.57E-14	4.99E-17	5.68E-19	1.57E-14	5.28E-19	3.10E-17	0.00E+00	1.42E-14	1.40E-12	6.20E-12	7.69E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-07	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.40E-20	0.00E+00	1.44E-24	0.00E+00	1.13E-23	0.00E+00	0.00E+00	3.91E-21	2.06E-21	2.77E-21	3.28E-20
	HTO	mSv/a	9.76E-08	0.00E+00	1.93E-06	6.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-09	4.65E-07	8.75E-07	3.44E-06
	I-129	mSv/a	1.02E-13	9.50E-19	4.41E-10	1.12E-14	5.61E-15	4.10E-12	9.19E-13	4.79E-13	0.00E+00	1.43E-11	2.68E-11	6.92E-10	1.18E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	3.22E-25	1.26E-25	2.01E-29	7.27E-23	2.60E-28	4.65E-24	0.00E+00	5.24E-25	2.87E-26	2.25E-28	7.83E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	3.26E-11	0.00E+00	2.00E-15	0.00E+00	2.16E-14	0.00E+00	0.00E+00	3.71E-12	3.87E-11	2.47E-11	9.97E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	6.28E-11	6.00E-15	2.57E-15	2.04E-11	2.98E-16	1.08E-14	0.00E+00	1.02E-11	3.08E-12	6.56E-13	9.71E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-09	7.73E-08	1.05E-07	1.86E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.14E-13	2.59E-18	7.12E-18	1.32E-14	2.92E-16	2.30E-15	0.00E+00	6.18E-15	1.19E-14	2.56E-16	1.48E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	6.62E-16	6.08E-17	1.24E-22	1.11E-16	1.69E-18	7.19E-15	0.00E+00	3.59E-17	1.60E-17	9.19E-19	8.08E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	7.69E-12	6.78E-18	2.75E-16	6.13E-14	4.74E-15	2.69E-16	0.00E+00	1.25E-10	6.13E-12	9.20E-12	1.48E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.39E-07	4.48E-16	1.34E-13	3.81E-15	8.59E-14	1.24E-17	0.00E+00	1.13E-07	4.98E-08	1.15E-07	4.17E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	5.83E-10	7.80E-17	3.59E-14	1.68E-13	6.63E-11	3.01E-13	0.00E+00	6.64E-08	2.45E-12	1.34E-12	6.70E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.41E-12	1.93E-19	8.67E-17	8.61E-16	1.60E-13	4.08E-16	0.00E+00	1.61E-10	5.93E-15	3.25E-15	1.62E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.70E-13	3.47E-16	2.15E-20	2.51E-16	9.49E-16	5.40E-14	0.00E+00	5.87E-15	4.01E-14	2.03E-14	3.92E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.09E-18	8.18E-21	2.79E-26	2.55E-21	3.84E-21	1.70E-18	0.00E+00	2.37E-20	6.50E-20	4.53E-20	2.95E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	1.31E-13	1.12E-17	1.36E-20	1.50E-16	4.61E-16	1.98E-14	0.00E+00	2.85E-15	2.32E-14	1.10E-14	1.89E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.17E-13	3.20E-16	4.49E-17	1.12E-12	2.52E-15	3.02E-13	0.00E+00	1.56E-14	4.20E-13	1.33E-13	2.71E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.16E-17	6.53E-21	1.61E-22	2.30E-18	4.08E-20	2.81E-18	0.00E+00	2.52E-19	5.08E-18	1.68E-18	2.38E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.76E-11	5.77E-15	1.09E-17	2.52E-15	6.54E-17	2.83E-16	0.00E+00	2.99E-12	1.21E-11	1.23E-11	5.50E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	2.61E-15	1.58E-17	3.39E-22	6.14E-17	2.35E-16	2.06E-13	0.00E+00	8.48E-17	5.26E-18	3.45E-17	2.09E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.64E-19	2.07E-22	1.26E-24	1.04E-19	2.37E-20	9.60E-18	0.00E+00	8.57E-21	1.14E-21	5.16E-21	1.00E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	1.43E-13	9.35E-18	8.96E-18	2.60E-14	1.29E-14	1.48E-13	0.00E+00	4.66E-15	1.38E-15	3.13E-15	3.40E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	1.18E-13	7.98E-20	7.39E-18	4.36E-15	1.06E-14	2.95E-14	0.00E+00	3.83E-15	1.13E-15	2.58E-15	1.70E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	1.31E-16	1.05E-18	9.74E-25	3.98E-18	1.18E-17	2.24E-13	0.00E+00	4.28E-18	2.48E-20	4.41E-19	2.24E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	8.38E-19	5.87E-25	5.26E-23	2.25E-18	7.55E-20	1.56E-17	0.00E+00	2.73E-20	8.06E-21	1.83E-20	1.88E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	9.09E-15	3.01E-17	1.52E-21	2.14E-16	8.19E-16	1.16E-13	0.00E+00	2.96E-16	2.09E-17	1.30E-16	1.26E-13
	U-233	mSv/a	0.00E+00	0.00E+00	2.16E-12	5.69E-18	1.24E-16	1.92E-14	5.11E-17	2.69E-17	0.00E+00	1.12E-14	1.20E-13	1.63E-12	3.94E-12
	U-234	mSv/a	0.00E+00	0.00E+00	6.52E-12	7.92E-18	3.75E-16	1.85E-14	1.55E-16	5.49E-18	0.00E+00	3.39E-14	3.62E-13	4.94E-12	1.19E-11
	U-235	mSv/a	0.00E+00	0.00E+00	2.55E-12	3.32E-15	1.47E-16	2.00E-12	6.04E-17	3.74E-15	0.00E+00	1.33E-14	1.41E-13	1.93E-12	6.65E-12
	U-236	mSv/a	0.00E+00	0.00E+00	3.44E-12	2.78E-18	1.98E-16	8.75E-15	8.15E-17	1.63E-18	0.00E+00	1.79E-14	1.91E-13	2.60E-12	6.26E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.69E-11	1.28E-16	9.72E-16	1.04E-11	4.00E-16	4.27E-15	0.00E+00	8.79E-14	9.36E-13	1.28E-11	4.11E-11
	Total	**mSv/a**	**9.76E-08**	**8.61E-15**	**2.29E-06**	**6.50E-08**	**2.09E-13**	**4.00E-11**	**7.55E-07**	**3.19E-03**	**0.00E+00**	**7.16E-06**	**3.46E-06**	**3.75E-05**	**3.24E-03**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	3.33E-15	1.47E-17	8.01E-21	1.13E-17	9.28E-17	5.25E-16	0.00E+00	4.78E-16	7.36E-17	1.07E-16	4.63E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	9.57E-14	3.09E-19	1.18E-16	9.11E-15	2.67E-15	9.96E-16	0.00E+00	1.37E-14	7.74E-15	6.39E-15	1.36E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.62E-15	6.92E-16	2.98E-18	3.37E-13	2.52E-15	1.43E-12	0.00E+00	1.71E-15	1.06E-15	4.84E-15	1.78E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.15E-13	5.70E-16	6.21E-19	1.26E-15	4.22E-14	2.89E-14	0.00E+00	1.82E-13	6.59E-16	1.62E-14	7.87E-13
	C-14	mSv/a	1.07E-11	8.61E-15	1.24E-07	4.79E-12	5.14E-13	1.36E-12	1.01E-10	2.85E-12	0.00E+00	6.76E-06	2.58E-06	4.32E-05	5.27E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	3.98E-12	0.00E+00	6.11E-15	0.00E+00	1.24E-14	0.00E+00	0.00E+00	7.62E-14	9.43E-12	9.04E-12	2.25E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	4.53E-14	4.99E-17	1.60E-17	1.57E-14	1.48E-17	3.10E-17	0.00E+00	2.04E-14	1.86E-12	1.81E-11	2.00E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-06	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.24E-20	0.00E+00	2.56E-23	0.00E+00	2.00E-22	0.00E+00	0.00E+00	3.55E-21	1.73E-21	1.98E-21	1.98E-20
	HTO	mSv/a	1.16E-07	0.00E+00	9.59E-07	5.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-09	3.78E-07	1.49E-06	3.00E-06
	I-129	mSv/a	1.72E-13	9.50E-19	3.03E-10	1.12E-14	1.33E-13	4.10E-12	2.18E-11	4.79E-13	0.00E+00	1.74E-11	3.01E-11	1.57E-09	1.95E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.57E-25	1.26E-25	5.53E-28	7.27E-23	7.14E-27	4.65E-24	0.00E+00	7.37E-25	3.74E-26	2.95E-28	7.85E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.27E-11	0.00E+00	4.81E-14	0.00E+00	5.20E-13	0.00E+00	0.00E+00	4.55E-12	4.38E-11	4.21E-11	1.14E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	2.50E-11	6.00E-15	3.53E-14	2.04E-11	4.09E-15	1.08E-14	0.00E+00	7.17E-12	2.01E-12	2.80E-13	5.49E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-09	6.86E-08	1.26E-07	1.98E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	5.87E-14	2.59E-18	1.27E-16	1.32E-14	5.20E-15	2.30E-15	0.00E+00	5.62E-15	1.00E-14	3.52E-16	9.55E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	5.75E-16	6.08E-17	3.73E-21	1.11E-16	5.09E-17	7.19E-15	0.00E+00	5.50E-17	2.28E-17	2.10E-18	8.07E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	8.43E-12	6.78E-18	1.04E-14	6.13E-14	1.80E-13	2.69E-16	0.00E+00	2.42E-10	1.10E-11	1.88E-11	2.81E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.20E-07	4.48E-16	3.99E-12	3.81E-15	2.56E-12	1.24E-17	0.00E+00	1.73E-07	7.04E-08	1.26E-07	4.89E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	2.50E-10	7.80E-17	5.33E-13	1.68E-13	9.85E-10	3.01E-13	0.00E+00	5.03E-08	1.73E-12	2.26E-12	5.16E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	6.06E-13	1.93E-19	1.29E-15	8.61E-16	2.38E-12	4.08E-16	0.00E+00	1.22E-10	4.18E-15	5.48E-15	1.25E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	4.84E-13	3.47E-16	1.33E-18	2.51E-16	5.87E-14	5.40E-14	0.00E+00	1.85E-14	1.18E-13	9.44E-14	8.28E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.74E-18	8.18E-21	1.53E-24	2.55E-21	2.11E-19	1.70E-18	0.00E+00	6.66E-20	1.69E-19	1.94E-19	4.10E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.64E-13	1.12E-17	9.47E-19	1.50E-16	3.20E-14	1.98E-14	0.00E+00	1.01E-14	7.63E-14	5.73E-14	4.60E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	8.16E-13	3.20E-16	1.76E-15	1.12E-12	9.89E-14	3.02E-13	0.00E+00	3.12E-14	7.80E-13	3.88E-13	3.53E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.62E-17	6.53E-21	1.25E-20	2.30E-18	3.17E-18	2.81E-18	0.00E+00	1.00E-18	1.87E-17	9.66E-18	6.38E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.23E-11	5.77E-15	3.04E-16	2.52E-15	1.83E-15	2.83E-16	0.00E+00	4.27E-12	1.60E-11	1.99E-11	6.24E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	2.71E-15	1.58E-17	1.22E-20	6.14E-17	8.43E-15	2.06E-13	0.00E+00	1.56E-16	8.95E-18	6.43E-17	2.18E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.19E-19	2.07E-22	3.61E-23	1.04E-19	6.80E-19	9.60E-18	0.00E+00	1.25E-20	1.54E-21	7.61E-21	1.06E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.21E-14	9.35E-18	1.56E-16	2.60E-14	2.24E-13	1.48E-13	0.00E+00	4.14E-15	1.13E-15	2.86E-15	4.79E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.36E-14	7.98E-20	1.16E-16	4.36E-15	1.67E-13	2.95E-14	0.00E+00	3.08E-15	8.42E-16	2.13E-15	2.60E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	1.14E-16	1.05E-18	2.91E-23	3.98E-18	3.54E-16	2.24E-13	0.00E+00	6.54E-18	3.52E-20	7.42E-19	2.25E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	4.20E-19	5.87E-25	9.11E-22	2.25E-18	1.31E-18	1.56E-17	0.00E+00	2.41E-20	6.61E-21	1.67E-20	1.96E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	7.87E-15	3.01E-17	4.56E-20	2.14E-16	2.45E-14	1.16E-13	0.00E+00	4.52E-16	2.96E-17	2.02E-16	1.49E-13
	U-233	mSv/a	0.00E+00	0.00E+00	1.31E-12	5.69E-18	2.61E-15	1.92E-14	1.07E-15	2.69E-17	0.00E+00	1.21E-14	1.19E-13	2.70E-12	4.17E-12
	U-234	mSv/a	0.00E+00	0.00E+00	3.92E-12	7.92E-18	7.80E-15	1.85E-14	3.21E-15	5.49E-18	0.00E+00	3.60E-14	3.55E-13	8.07E-12	1.24E-11
	U-235	mSv/a	0.00E+00	0.00E+00	1.53E-12	3.32E-15	3.05E-15	2.00E-12	1.26E-15	3.74E-15	0.00E+00	1.41E-14	1.39E-13	3.16E-12	6.86E-12
	U-236	mSv/a	0.00E+00	0.00E+00	2.04E-12	2.78E-18	4.05E-15	8.75E-15	1.67E-15	1.63E-18	0.00E+00	1.87E-14	1.85E-13	4.20E-12	6.45E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.02E-11	1.28E-16	2.02E-14	1.04E-11	8.32E-15	4.27E-15	0.00E+00	9.33E-14	9.21E-13	2.09E-11	4.25E-11
	Total	**mSv/a**	**1.16E-07**	**8.61E-15**	**1.20E-06**	**5.41E-08**	**5.31E-12**	**4.00E-11**	**7.99E-06**	**3.19E-03**	**0.00E+00**	**6.99E-06**	**3.10E-06**	**4.49E-05**	**3.25E-03**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	2.35E-16	1.94E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	8.71E-15	4.45E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	1.24E-14	2.32E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	3.17E-14	4.41E-13
	C-14	mSv/a	7.29E-12	8.61E-15	0.00E+00	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	6.78E-05	7.47E-05

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	9.87E-12	1.36E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	6.00E-11	6.22E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	2.59E-21	7.43E-21
	HTO	mSv/a	8.00E-08	0.00E+00	0.00E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	3.11E-06	3.51E-06
	I-129	mSv/a	6.53E-14	1.24E-18	0.00E+00	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	1.78E-09	1.84E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	4.73E-28	1.01E-22
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-10	1.71E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	2.89E-13	3.32E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	2.06E-07	2.57E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.40E-16	3.69E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.01E-18	9.79E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	2.61E-11	1.94E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	1.97E-07	4.99E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	3.59E-12	2.90E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	8.68E-15	7.01E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	2.10E-13	5.74E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	4.54E-19	3.51E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	1.25E-13	3.20E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	4.23E-13	2.78E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	1.28E-17	3.62E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	5.42E-11	8.37E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	1.34E-16	2.97E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	1.27E-20	1.45E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	3.22E-15	6.34E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	2.54E-15	3.65E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	1.84E-18	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	1.81E-20	2.55E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	4.64E-16	2.43E-13
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.25E-12	4.38E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.24E-11	1.27E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	5.07E-12	7.79E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.83E-12	7.00E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.23E-11	4.66E-11
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**0.00E+00**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**7.13E-05**	**4.23E-03**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	7.27E-15	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	7.57E-17	9.05E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.30E-13	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	2.85E-15	1.68E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.71E-15	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	3.64E-16	2.31E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.13E-12	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	1.23E-14	1.55E-12
	C-14	mSv/a	7.29E-12	8.61E-15	1.62E-07	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	1.18E-05	1.88E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.83E-12	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	2.09E-13	6.79E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	9.83E-14	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	1.81E-12	4.07E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.83E-20	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	1.02E-21	2.42E-20
	HTO	mSv/a	8.00E-08	0.00E+00	1.33E-06	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	1.21E-07	1.86E-06
	I-129	mSv/a	6.53E-14	1.24E-18	2.30E-10	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	5.79E-11	3.42E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.79E-25	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	1.89E-28	1.02E-22
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.58E-11	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-11	1.14E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	3.12E-11	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	1.26E-13	6.42E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	3.45E-08	8.54E-08
	Pa-231	mSv/a	0.00E+00	0.00E+00	5.43E-14	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.25E-17	9.08E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.23E-15	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.11E-19	1.10E-14
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.05E-11	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	5.65E-12	1.84E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	2.66E-07	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	9.84E-08	6.67E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	2.55E-10	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	7.40E-14	2.92E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	6.17E-13	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	1.79E-16	7.07E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	7.75E-13	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	1.43E-14	1.15E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.89E-18	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	2.79E-20	5.97E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.15E-13	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	8.61E-15	6.19E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	6.41E-13	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	2.93E-14	3.03E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.50E-17	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	9.08E-19	4.94E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.39E-11	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	9.64E-12	9.30E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	5.40E-15	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	3.49E-17	3.02E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	3.53E-19	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	3.39E-21	1.48E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.61E-14	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	7.91E-16	7.08E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.99E-14	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	6.23E-16	4.23E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	2.52E-16	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	3.84E-19	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	4.27E-19	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	4.44E-21	2.59E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	1.74E-14	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	1.22E-16	2.60E-13
	U-233	mSv/a	0.00E+00	0.00E+00	1.54E-12	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.18E-13	2.08E-12
	U-234	mSv/a	0.00E+00	0.00E+00	4.51E-12	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.22E-12	6.04E-12
	U-235	mSv/a	0.00E+00	0.00E+00	1.84E-12	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	4.98E-13	5.06E-12
	U-236	mSv/a	0.00E+00	0.00E+00	2.48E-12	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.72E-13	3.32E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.17E-11	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.18E-12	2.91E-11
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**1.76E-06**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**1.21E-05**	**4.18E-03**

Table 5-12: Estimated Radiation Dose for New On-site Farm 3 Month Old during Post-Closure – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.96E-17	8.79E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-15	1.93E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E-16	4.38E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-14	1.60E-14
	C-14	mSv/a	3.07E-12	8.61E-15	0.00E+00	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-04	5.39E-04
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-11	1.00E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-11	3.68E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-06	1.46E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-21	1.91E-21
	HTO	mSv/a	4.42E-08	0.00E+00	0.00E+00	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.45E-06	6.51E-06
	I-129	mSv/a	2.34E-14	1.24E-18	0.00E+00	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.68E-10	8.74E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-27	9.45E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-12	8.73E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E-14	2.70E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-07	2.49E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-11	5.00E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.74E-08	9.74E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-11	4.68E-11
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-14	1.14E-13
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-14	3.42E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-20	9.31E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-14	2.37E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-14	1.51E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-18	4.92E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-11	1.92E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.18E-17	1.36E-16
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.95E-21	1.44E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-15	3.77E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-15	8.39E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.73E-19	6.30E-18
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-21	2.94E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E-17	3.49E-16
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-14	7.79E-14
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-13	1.86E-13
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-14	2.67E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-14	9.57E-14
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-13	1.39E-11
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**0.00E+00**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**5.47E-04**	**5.48E-04**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	2.48E-14	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.84E-12	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-12

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.62E-15	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.33E-12	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-12
	C-14	mSv/a	3.07E-12	8.61E-15	1.90E-07	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	8.71E-12	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.72E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	2.04E-13	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.45E-19	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-19
	HTO	mSv/a	4.42E-08	0.00E+00	2.35E-06	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-06
	I-129	mSv/a	2.34E-14	1.24E-18	2.51E-10	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	9.90E-25	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.55E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.15E-10	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	3.97E-10	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	7.81E-13	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.57E-15	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.73E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	3.26E-11	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	1.05E-06	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	3.41E-09	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-09
	Pu-240	mSv/a	0.00E+00	0.00E+00	8.24E-12	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.26E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	4.99E-12	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.58E-17	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-17
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.28E-12	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	4.19E-12	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.78E-16	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-16
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.50E-10	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	3.09E-14	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	4.71E-18	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	1.12E-12	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-12
	Th-230	mSv/a	0.00E+00	0.00E+00	8.00E-13	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	5.25E-16	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	5.83E-18	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	3.72E-14	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-14
	U-233	mSv/a	0.00E+00	0.00E+00	5.59E-12	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-12
	U-234	mSv/a	0.00E+00	0.00E+00	1.71E-11	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-11
	U-235	mSv/a	0.00E+00	0.00E+00	6.61E-12	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-12
	U-236	mSv/a	0.00E+00	0.00E+00	8.91E-12	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-12
	U-238	mSv/a	0.00E+00	0.00E+00	4.44E-11	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-11
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**3.59E-06**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.65E-06**

Table 5-13: Estimated Radiation Dose for Farm A Resident during Post-Closure – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	6.93E-17	2.74E-19	4.83E-24	2.10E-19	5.59E-20	9.78E-18	0.00E+00	5.64E-18	9.36E-19	1.16E-18	8.74E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.32E-15	5.82E-21	1.18E-19	1.71E-16	2.67E-18	1.87E-17	0.00E+00	2.70E-16	1.64E-16	1.17E-16	4.06E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	4.09E-17	1.30E-17	2.18E-21	6.33E-15	1.84E-18	2.68E-14	0.00E+00	2.44E-17	1.64E-17	3.29E-17	3.33E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.07E-14	1.05E-17	3.74E-22	2.32E-17	2.54E-17	5.34E-16	0.00E+00	2.15E-15	8.38E-18	2.34E-16	1.37E-14
	C-14	mSv/a	1.28E-13	1.47E-16	4.24E-09	9.01E-14	5.09E-16	2.56E-14	1.01E-13	5.36E-14	0.00E+00	1.31E-07	5.40E-08	6.85E-07	8.74E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	7.45E-14	0.00E+00	3.31E-18	0.00E+00	6.71E-18	0.00E+00	0.00E+00	8.08E-16	1.08E-13	4.68E-14	2.30E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.05E-15	9.39E-19	1.07E-20	2.94E-16	9.94E-21	5.82E-19	0.00E+00	2.67E-16	2.64E-14	1.17E-13	1.45E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-08	3.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	4.52E-22	0.00E+00	2.71E-26	0.00E+00	2.12E-25	0.00E+00	0.00E+00	7.35E-23	3.87E-23	5.20E-23	6.16E-22
	HTO	mSv/a	1.74E-09	0.00E+00	3.62E-08	1.22E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-10	8.69E-09	1.64E-08	6.44E-08
	I-129	mSv/a	1.74E-15	1.63E-20	8.28E-12	2.11E-16	1.06E-16	7.71E-14	1.73E-14	9.01E-15	0.00E+00	2.70E-13	5.02E-13	1.29E-11	2.20E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	6.06E-27	2.38E-27	3.78E-31	1.37E-24	4.89E-30	8.75E-26	0.00E+00	9.86E-27	5.40E-28	4.24E-30	1.47E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	6.13E-13	0.00E+00	3.77E-17	0.00E+00	4.07E-16	0.00E+00	0.00E+00	6.98E-14	7.27E-13	4.64E-13	1.87E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	1.18E-12	1.13E-16	4.83E-17	3.83E-13	5.60E-18	2.04E-16	0.00E+00	1.92E-13	5.80E-14	1.23E-14	1.83E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.33E-11	1.44E-09	1.98E-09	3.48E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.14E-15	4.87E-20	1.34E-19	2.47E-16	5.48E-18	4.33E-17	0.00E+00	1.16E-16	2.24E-16	4.81E-18	2.78E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.24E-17	1.14E-18	2.33E-24	2.07E-18	3.18E-20	1.35E-16	0.00E+00	6.72E-19	3.00E-19	1.72E-20	1.51E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.45E-13	1.28E-19	5.17E-18	1.15E-15	8.92E-17	5.07E-18	0.00E+00	2.35E-12	1.15E-13	1.73E-13	2.79E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.62E-09	8.43E-18	2.52E-15	7.16E-17	1.62E-15	2.32E-19	0.00E+00	2.13E-09	9.36E-10	2.15E-09	7.84E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.10E-11	1.47E-18	6.75E-16	3.16E-15	1.25E-12	5.65E-15	0.00E+00	1.25E-09	4.61E-14	2.53E-14	1.26E-09
	Pu-240	mSv/a	0.00E+00	0.00E+00	2.65E-14	3.62E-21	1.63E-18	1.62E-17	3.02E-15	7.67E-18	0.00E+00	3.02E-12	1.12E-16	6.12E-17	3.05E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	5.05E-15	6.47E-18	4.02E-22	4.69E-18	1.77E-17	1.01E-15	0.00E+00	1.09E-16	7.48E-16	3.79E-16	7.32E-15
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.01E-20	1.50E-22	5.11E-28	4.68E-23	7.04E-23	3.13E-20	0.00E+00	4.35E-22	1.19E-21	8.31E-22	5.41E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.46E-15	2.10E-19	2.55E-22	2.80E-18	8.62E-18	3.70E-16	0.00E+00	5.33E-17	4.33E-16	2.06E-16	3.53E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.35E-14	6.02E-18	8.44E-19	2.10E-14	4.73E-17	5.67E-15	0.00E+00	2.93E-16	7.89E-15	2.50E-15	5.09E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.19E-19	1.23E-22	3.04E-24	4.32E-20	7.68E-22	5.29E-20	0.00E+00	4.75E-21	9.54E-20	3.16E-20	4.48E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.19E-13	1.09E-16	2.05E-19	4.74E-17	1.23E-18	5.32E-18	0.00E+00	5.63E-14	2.27E-13	2.32E-13	1.03E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	4.88E-17	2.95E-19	6.34E-24	1.15E-18	4.39E-18	3.86E-15	0.00E+00	1.59E-18	9.84E-20	6.45E-19	3.92E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	4.96E-21	3.90E-24	2.37E-26	1.96E-21	4.46E-22	1.81E-19	0.00E+00	1.61E-22	2.14E-23	9.69E-23	1.88E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	2.69E-15	1.76E-19	1.69E-19	4.90E-16	2.42E-16	2.79E-15	0.00E+00	8.75E-17	2.59E-17	5.89E-17	6.39E-15
	Th-230	mSv/a	0.00E+00	0.00E+00	2.21E-15	1.50E-21	1.39E-19	8.19E-17	2.00E-16	5.54E-16	0.00E+00	7.21E-17	2.13E-17	4.84E-17	3.19E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	2.27E-18	1.82E-20	1.68E-26	6.88E-20	2.05E-19	3.88E-15	0.00E+00	7.40E-20	4.29E-22	7.63E-21	3.88E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	1.58E-20	1.10E-26	9.89E-25	4.22E-20	1.42E-21	2.93E-19	0.00E+00	5.13E-22	1.52E-22	3.45E-22	3.54E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.70E-16	5.65E-19	2.85E-23	4.01E-18	1.53E-17	2.17E-15	0.00E+00	5.54E-18	3.91E-19	2.44E-18	2.36E-15
	U-233	mSv/a	0.00E+00	0.00E+00	4.05E-14	1.07E-19	2.33E-18	3.61E-16	9.61E-19	5.07E-19	0.00E+00	2.11E-16	2.25E-15	3.07E-14	7.41E-14
	U-234	mSv/a	0.00E+00	0.00E+00	1.23E-13	1.49E-19	7.06E-18	3.48E-16	2.91E-18	1.03E-19	0.00E+00	6.38E-16	6.80E-15	9.29E-14	2.23E-13
	U-235	mSv/a	0.00E+00	0.00E+00	4.79E-14	6.24E-17	2.76E-18	3.77E-14	1.14E-18	7.04E-17	0.00E+00	2.50E-16	2.66E-15	3.63E-14	1.25E-13
	U-236	mSv/a	0.00E+00	0.00E+00	6.46E-14	5.24E-20	3.72E-18	1.65E-16	1.53E-18	3.06E-20	0.00E+00	3.36E-16	3.58E-15	4.90E-14	1.18E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-238	mSv/a	0.00E+00	0.00E+00	3.17E-13	2.41E-18	1.83E-17	1.95E-13	7.53E-18	8.03E-17	0.00E+00	1.65E-15	1.76E-14	2.41E-13	7.72E-13
	Total	**mSv/a**	**1.74E-09**	**1.47E-16**	**4.31E-08**	**1.22E-09**	**3.94E-15**	**7.53E-13**	**7.91E-08**	**3.34E-04**	**0.00E+00**	**1.35E-07**	**6.51E-08**	**7.05E-07**	**3.35E-04**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	6.21E-17	2.74E-19	1.49E-22	2.10E-19	1.73E-18	9.78E-18	0.00E+00	8.91E-18	1.37E-18	1.99E-18	8.64E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.80E-15	5.82E-21	2.22E-18	1.71E-16	5.01E-17	1.87E-17	0.00E+00	2.58E-16	1.45E-16	1.20E-16	2.57E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.05E-17	1.30E-17	5.61E-20	6.33E-15	4.74E-17	2.68E-14	0.00E+00	3.21E-17	2.00E-17	9.10E-17	3.34E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	9.52E-15	1.05E-17	1.15E-20	2.32E-17	7.80E-16	5.34E-16	0.00E+00	3.37E-15	1.22E-17	2.99E-16	1.45E-14
	C-14	mSv/a	1.83E-13	1.47E-16	2.33E-09	9.01E-14	9.66E-15	2.56E-14	1.91E-12	5.36E-14	0.00E+00	1.27E-07	4.85E-08	8.12E-07	9.90E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	7.49E-14	0.00E+00	1.15E-16	0.00E+00	2.33E-16	0.00E+00	0.00E+00	1.43E-15	1.77E-13	1.70E-13	4.24E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	8.52E-16	9.39E-19	3.00E-19	2.94E-16	2.79E-19	5.82E-19	0.00E+00	3.83E-16	3.49E-14	3.41E-13	3.77E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.37E-07	3.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.32E-22	0.00E+00	4.82E-25	0.00E+00	3.77E-24	0.00E+00	0.00E+00	6.67E-23	3.25E-23	3.73E-23	3.73E-22
	HTO	mSv/a	2.07E-09	0.00E+00	1.80E-08	1.02E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-10	7.07E-09	2.79E-08	5.62E-08
	I-129	mSv/a	2.94E-15	1.63E-20	5.70E-12	2.11E-16	2.51E-15	7.71E-14	4.11E-13	9.01E-15	0.00E+00	3.27E-13	5.64E-13	2.92E-11	3.63E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.82E-27	2.38E-27	1.04E-29	1.37E-24	1.34E-28	8.75E-26	0.00E+00	1.39E-26	7.02E-28	5.55E-30	1.48E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.26E-13	0.00E+00	9.04E-16	0.00E+00	9.77E-15	0.00E+00	0.00E+00	8.56E-14	8.25E-13	7.92E-13	2.14E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	4.70E-13	1.13E-16	6.64E-16	3.83E-13	7.70E-17	2.04E-16	0.00E+00	1.35E-13	3.78E-14	5.26E-15	1.03E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-11	1.28E-09	2.37E-09	3.71E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.10E-15	4.87E-20	2.38E-18	2.47E-16	9.77E-17	4.33E-17	0.00E+00	1.06E-16	1.89E-16	6.62E-18	1.80E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.08E-17	1.14E-18	6.99E-23	2.07E-18	9.53E-19	1.35E-16	0.00E+00	1.03E-18	4.27E-19	3.94E-20	1.51E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.59E-13	1.28E-19	1.96E-16	1.15E-15	3.38E-15	5.07E-18	0.00E+00	4.55E-12	2.06E-13	3.54E-13	5.28E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.26E-09	8.43E-18	7.49E-14	7.16E-17	4.81E-14	2.32E-19	0.00E+00	3.24E-09	1.32E-09	2.37E-09	9.19E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	4.71E-12	1.47E-18	1.00E-14	3.16E-15	1.85E-11	5.65E-15	0.00E+00	9.47E-10	3.25E-14	4.26E-14	9.70E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.14E-14	3.62E-21	2.42E-17	1.62E-17	4.48E-14	7.67E-18	0.00E+00	2.29E-12	7.85E-17	1.03E-16	2.35E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.04E-15	6.47E-18	2.49E-20	4.69E-18	1.10E-15	1.01E-15	0.00E+00	3.46E-16	2.19E-15	1.76E-15	1.55E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	3.19E-20	1.50E-22	2.81E-26	4.68E-23	3.87E-21	3.13E-20	0.00E+00	1.22E-21	3.11E-21	3.55E-21	7.52E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.94E-15	2.10E-19	1.77E-20	2.80E-18	5.99E-16	3.70E-16	0.00E+00	1.89E-16	1.43E-15	1.07E-15	8.60E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.53E-14	6.02E-18	3.31E-17	2.10E-14	1.86E-15	5.67E-15	0.00E+00	5.87E-16	1.47E-14	7.30E-15	6.64E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.92E-19	1.23E-22	2.36E-22	4.32E-20	5.97E-20	5.29E-20	0.00E+00	1.88E-20	3.51E-19	1.82E-19	1.20E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	4.19E-13	1.09E-16	5.72E-18	4.74E-17	3.43E-17	5.32E-18	0.00E+00	8.03E-14	3.00E-13	3.74E-13	1.17E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	5.07E-17	2.95E-19	2.28E-22	1.15E-18	1.58E-16	3.86E-15	0.00E+00	2.91E-18	1.68E-19	1.20E-18	4.07E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	4.11E-21	3.90E-24	6.79E-25	1.96E-21	1.28E-20	1.81E-19	0.00E+00	2.36E-22	2.90E-23	1.43E-22	2.00E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.36E-15	1.76E-19	2.93E-18	4.90E-16	4.22E-15	2.79E-15	0.00E+00	7.78E-17	2.13E-17	5.39E-17	9.01E-15
	Th-230	mSv/a	0.00E+00	0.00E+00	1.01E-15	1.50E-21	2.18E-18	8.19E-17	3.14E-15	5.54E-16	0.00E+00	5.78E-17	1.58E-17	4.00E-17	4.90E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	1.97E-18	1.82E-20	5.04E-25	6.88E-20	6.13E-18	3.88E-15	0.00E+00	1.13E-19	6.08E-22	1.28E-20	3.89E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	7.91E-21	1.10E-26	1.71E-23	4.22E-20	2.46E-20	2.93E-19	0.00E+00	4.54E-22	1.24E-22	3.14E-22	3.69E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.48E-16	5.65E-19	8.54E-22	4.01E-18	4.59E-16	2.17E-15	0.00E+00	8.47E-18	5.54E-19	3.78E-18	2.79E-15
	U-233	mSv/a	0.00E+00	0.00E+00	2.47E-14	1.07E-19	4.91E-17	3.61E-16	2.02E-17	5.07E-19	0.00E+00	2.27E-16	2.24E-15	5.08E-14	7.84E-14
	U-234	mSv/a	0.00E+00	0.00E+00	7.37E-14	1.49E-19	1.47E-16	3.48E-16	6.04E-17	1.03E-19	0.00E+00	6.77E-16	6.68E-15	1.52E-13	2.33E-13
	U-235	mSv/a	0.00E+00	0.00E+00	2.88E-14	6.24E-17	5.74E-17	3.77E-14	2.36E-17	7.04E-17	0.00E+00	2.65E-16	2.61E-15	5.94E-14	1.29E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-236	mSv/a	0.00E+00	0.00E+00	3.83E-14	5.24E-20	7.62E-17	1.65E-16	3.14E-17	3.06E-20	0.00E+00	3.52E-16	3.47E-15	7.89E-14	1.21E-13
	U-238	mSv/a	0.00E+00	0.00E+00	1.91E-13	2.41E-18	3.80E-16	1.95E-13	1.56E-16	8.03E-17	0.00E+00	1.75E-15	1.73E-14	3.93E-13	7.99E-13
	Total	**mSv/a**	**2.07E-09**	**1.47E-16**	**2.26E-08**	**1.02E-09**	**9.98E-14**	**7.53E-13**	**8.37E-07**	**3.34E-04**	**0.00E+00**	**1.31E-07**	**5.82E-08**	**8.45E-07**	**3.36E-04**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.78E-20	5.52E-22	2.73E-19	6.39E-18	1.27E-17	0.00E+00	1.03E-17	1.89E-18	4.39E-18	3.61E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-21	5.09E-18	2.23E-16	1.15E-16	2.43E-17	0.00E+00	1.86E-16	1.20E-16	1.64E-16	8.37E-16
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.22E-18	1.59E-19	8.23E-15	1.35E-16	3.49E-14	0.00E+00	2.86E-17	2.10E-17	2.34E-16	4.35E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.26E-20	3.02E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	5.85E-16	8.15E-15
	C-14	mSv/a	1.25E-13	1.47E-16	0.00E+00	1.72E-14	2.14E-14	2.56E-14	4.23E-12	5.36E-14	0.00E+00	8.85E-08	4.01E-08	1.28E-06	1.40E-06
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-16	0.00E+00	2.80E-16	0.00E+00	0.00E+00	5.41E-16	6.96E-14	1.86E-13	2.56E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.79E-19	1.10E-18	2.94E-16	1.03E-18	5.82E-19	0.00E+00	4.43E-16	3.99E-14	1.13E-12	1.17E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-06	4.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-24	0.00E+00	9.46E-24	0.00E+00	0.00E+00	5.26E-23	2.76E-23	4.88E-23	1.40E-22
	HTO	mSv/a	1.43E-09	0.00E+00	0.00E+00	2.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.56E-11	5.76E-09	5.82E-08	6.57E-08
	I-129	mSv/a	1.12E-15	2.11E-20	0.00E+00	5.23E-17	3.22E-15	1.00E-13	5.27E-13	1.17E-14	0.00E+00	1.32E-13	2.56E-13	3.31E-11	3.42E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.89E-28	3.29E-29	1.78E-24	4.25E-28	1.14E-25	0.00E+00	1.38E-26	7.50E-28	8.89E-30	1.91E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-15	0.00E+00	3.35E-14	0.00E+00	0.00E+00	9.22E-14	9.34E-13	2.15E-12	3.21E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.80E-17	1.41E-15	4.98E-13	1.63E-16	2.65E-16	0.00E+00	8.97E-14	2.88E-14	5.44E-15	6.24E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-11	9.07E-10	3.86E-09	4.81E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.21E-20	3.74E-18	3.22E-16	1.53E-16	5.63E-17	0.00E+00	5.20E-17	9.85E-17	8.27E-18	6.94E-16
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-19	2.53E-22	2.70E-18	3.45E-18	1.75E-16	0.00E+00	1.17E-18	5.74E-19	1.13E-19	1.84E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	4.92E-13	3.65E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	2.81E-13	9.31E-17	1.81E-13	3.02E-19	0.00E+00	3.82E-09	1.85E-09	3.71E-09	9.38E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.63E-19	1.73E-14	4.11E-15	3.19E-11	7.35E-15	0.00E+00	5.13E-10	2.06E-14	6.75E-14	5.45E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.97E-22	4.18E-17	2.11E-17	7.73E-14	9.97E-18	0.00E+00	1.24E-12	4.99E-17	1.63E-16	1.32E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.60E-18	6.74E-20	6.10E-18	2.97E-15	1.31E-15	0.00E+00	2.95E-16	2.21E-15	3.92E-15	1.07E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	7.92E-26	6.09E-23	1.09E-20	4.07E-20	0.00E+00	1.08E-21	3.26E-21	8.33E-21	6.43E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.20E-20	4.71E-20	3.64E-18	1.59E-15	4.81E-16	0.00E+00	1.58E-16	1.41E-15	2.33E-15	5.98E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	4.41E-17	2.73E-14	2.47E-15	7.40E-15	0.00E+00	2.45E-16	6.88E-15	7.95E-15	5.23E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	3.82E-22	5.62E-20	9.67E-20	6.88E-20	0.00E+00	9.59E-21	2.09E-19	2.40E-19	6.80E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.07E-17	2.34E-17	4.74E-17	1.41E-16	5.32E-18	0.00E+00	1.03E-13	4.50E-13	1.02E-12	1.57E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.31E-20	7.69E-22	1.50E-18	5.33E-16	5.01E-15	0.00E+00	3.09E-18	2.10E-19	2.50E-18	5.55E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.67E-25	1.86E-24	2.55E-21	3.50E-20	2.34E-19	0.00E+00	2.03E-22	2.91E-23	2.40E-22	2.72E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.35E-20	5.25E-18	6.38E-16	7.54E-15	3.63E-15	0.00E+00	4.37E-17	1.28E-17	6.06E-17	1.19E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	4.77E-17	6.86E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.51E-21	1.89E-24	8.94E-20	2.30E-17	5.04E-15	0.00E+00	1.33E-19	8.48E-22	3.19E-20	5.07E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	2.95E-23	5.49E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.17E-23	3.40E-22	4.79E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.40E-19	3.20E-21	5.22E-18	1.72E-15	2.82E-15	0.00E+00	9.97E-18	7.72E-19	8.70E-18	4.56E-15
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.65E-20	9.77E-17	4.70E-16	4.02E-17	6.59E-19	0.00E+00	1.42E-16	1.58E-15	8.00E-14	8.23E-14
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.69E-20	2.86E-16	4.53E-16	1.18E-16	1.34E-19	0.00E+00	4.14E-16	4.61E-15	2.34E-13	2.40E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.54E-17	1.16E-16	4.90E-14	4.79E-17	9.15E-17	0.00E+00	1.69E-16	1.88E-15	9.53E-14	1.47E-13
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.30E-20	1.57E-16	2.14E-16	6.46E-17	3.97E-20	0.00E+00	2.28E-16	2.54E-15	1.28E-13	1.32E-13
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.96E-19	7.44E-16	2.53E-13	3.06E-16	1.04E-16	0.00E+00	1.08E-15	1.20E-14	6.08E-13	8.76E-13
	Total	**mSv/a**	**1.43E-09**	**1.47E-16**	**0.00E+00**	**2.68E-10**	**3.30E-13**	**9.70E-13**	**1.11E-06**	**4.34E-04**	**0.00E+00**	**9.30E-08**	**4.86E-08**	**1.34E-06**	**4.37E-04**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	1.36E-16	6.78E-20	5.52E-22	2.73E-19	6.39E-18	1.27E-17	0.00E+00	1.03E-17	1.89E-18	1.41E-18	1.69E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	2.44E-15	1.44E-21	5.09E-18	2.23E-16	1.15E-16	2.43E-17	0.00E+00	1.86E-16	1.20E-16	5.35E-17	3.16E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	5.10E-17	3.22E-18	1.59E-19	8.23E-15	1.35E-16	3.49E-14	0.00E+00	2.86E-17	2.10E-17	6.84E-18	4.34E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.08E-14	2.61E-18	4.26E-20	3.02E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	2.28E-16	2.86E-14
	C-14	mSv/a	1.25E-13	1.47E-16	3.05E-09	1.72E-14	2.14E-14	2.56E-14	4.23E-12	5.36E-14	0.00E+00	8.85E-08	4.01E-08	2.22E-07	3.54E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	5.31E-14	0.00E+00	1.38E-16	0.00E+00	2.80E-16	0.00E+00	0.00E+00	5.41E-16	6.96E-14	3.93E-15	1.28E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.85E-15	1.79E-19	1.10E-18	2.94E-16	1.03E-18	5.82E-19	0.00E+00	4.43E-16	3.99E-14	3.41E-14	7.65E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-06	4.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.44E-22	0.00E+00	1.21E-24	0.00E+00	9.46E-24	0.00E+00	0.00E+00	5.26E-23	2.76E-23	1.92E-23	4.55E-22
	HTO	mSv/a	1.43E-09	0.00E+00	2.50E-08	2.68E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.56E-11	5.76E-09	2.27E-09	3.48E-08
	I-129	mSv/a	1.12E-15	2.11E-20	4.32E-12	5.23E-17	3.22E-15	1.00E-13	5.27E-13	1.17E-14	0.00E+00	1.32E-13	2.56E-13	1.08E-12	6.43E-12
	Nb-94	mSv/a	0.00E+00	0.00E+00	9.01E-27	5.89E-28	3.29E-29	1.78E-24	4.25E-28	1.14E-25	0.00E+00	1.38E-26	7.50E-28	3.56E-30	1.92E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	8.62E-13	0.00E+00	3.10E-15	0.00E+00	3.35E-14	0.00E+00	0.00E+00	9.22E-14	9.34E-13	2.14E-13	2.14E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	5.87E-13	2.80E-17	1.41E-15	4.98E-13	1.63E-16	2.65E-16	0.00E+00	8.97E-14	2.88E-14	2.36E-15	1.21E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-11	9.07E-10	6.47E-10	1.60E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.02E-15	1.21E-20	3.74E-18	3.22E-16	1.53E-16	5.63E-17	0.00E+00	5.20E-17	9.85E-17	7.99E-19	1.71E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.30E-17	2.82E-19	2.53E-22	2.70E-18	3.45E-18	1.75E-16	0.00E+00	1.17E-18	5.74E-19	1.15E-20	2.06E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.97E-13	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	1.06E-13	3.46E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	5.01E-09	2.09E-18	2.81E-13	9.31E-17	1.81E-13	3.02E-19	0.00E+00	3.82E-09	1.85E-09	1.85E-09	1.25E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	4.80E-12	3.63E-19	1.73E-14	4.11E-15	3.19E-11	7.35E-15	0.00E+00	5.13E-10	2.06E-14	1.39E-15	5.50E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.16E-14	8.97E-22	4.18E-17	2.11E-17	7.73E-14	9.97E-18	0.00E+00	1.24E-12	4.99E-17	3.36E-18	1.33E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.45E-14	1.60E-18	6.74E-20	6.10E-18	2.97E-15	1.31E-15	0.00E+00	2.95E-16	2.21E-15	2.67E-16	2.15E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	5.31E-20	3.72E-23	7.92E-26	6.09E-23	1.09E-20	4.07E-20	0.00E+00	1.08E-21	3.26E-21	5.12E-22	1.10E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	7.76E-15	5.20E-20	4.71E-20	3.64E-18	1.59E-15	4.81E-16	0.00E+00	1.58E-16	1.41E-15	1.61E-16	1.16E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.20E-14	1.49E-18	4.41E-17	2.73E-14	2.47E-15	7.40E-15	0.00E+00	2.45E-16	6.88E-15	5.51E-16	5.69E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.71E-19	3.04E-23	3.82E-22	5.62E-20	9.67E-20	6.88E-20	0.00E+00	9.59E-21	2.09E-19	1.71E-20	9.28E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.01E-12	2.07E-17	2.34E-17	4.74E-17	1.41E-16	5.32E-18	0.00E+00	1.03E-13	4.50E-13	1.81E-13	1.75E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	1.01E-16	7.31E-20	7.69E-22	1.50E-18	5.33E-16	5.01E-15	0.00E+00	3.09E-18	2.10E-19	6.52E-19	5.65E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	6.64E-21	9.67E-25	1.86E-24	2.55E-21	3.50E-20	2.34E-19	0.00E+00	2.03E-22	2.91E-23	6.37E-23	2.79E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.43E-15	4.35E-20	5.25E-18	6.38E-16	7.54E-15	3.63E-15	0.00E+00	4.37E-17	1.28E-17	1.49E-17	1.33E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	1.13E-15	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	1.17E-17	7.95E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	4.36E-18	4.51E-21	1.89E-24	8.94E-20	2.30E-17	5.04E-15	0.00E+00	1.33E-19	8.48E-22	6.64E-21	5.07E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	8.03E-21	2.74E-27	2.95E-23	5.49E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.17E-23	8.35E-23	4.87E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	3.26E-16	1.40E-19	3.20E-21	5.22E-18	1.72E-15	2.82E-15	0.00E+00	9.97E-18	7.72E-19	2.28E-18	4.88E-15
	U-233	mSv/a	0.00E+00	0.00E+00	2.90E-14	2.65E-20	9.77E-17	4.70E-16	4.02E-17	6.59E-19	0.00E+00	1.42E-16	1.58E-15	7.87E-15	3.92E-14

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-234	mSv/a	0.00E+00	0.00E+00	8.48E-14	3.69E-20	2.86E-16	4.53E-16	1.18E-16	1.34E-19	0.00E+00	4.14E-16	4.61E-15	2.30E-14	1.14E-13
	U-235	mSv/a	0.00E+00	0.00E+00	3.46E-14	1.54E-17	1.16E-16	4.90E-14	4.79E-17	9.15E-17	0.00E+00	1.69E-16	1.88E-15	9.37E-15	9.52E-14
	U-236	mSv/a	0.00E+00	0.00E+00	4.66E-14	1.30E-20	1.57E-16	2.14E-16	6.46E-17	3.97E-20	0.00E+00	2.28E-16	2.54E-15	1.26E-14	6.24E-14
	U-238	mSv/a	0.00E+00	0.00E+00	2.21E-13	5.96E-19	7.44E-16	2.53E-13	3.06E-16	1.04E-16	0.00E+00	1.08E-15	1.20E-14	5.98E-14	5.48E-13
	Total	**mSv/a**	**1.43E-09**	**1.47E-16**	**3.31E-08**	**2.68E-10**	**3.30E-13**	**9.70E-13**	**1.11E-06**	**4.34E-04**	**0.00E+00**	**9.30E-08**	**4.86E-08**	**2.27E-07**	**4.36E-04**

Table 5-14: Estimated Radiation Dose for Farm A 3-Month Old during Post-Closure – Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.78E-20	8.79E-22	2.73E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-18	1.64E-18
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-21	3.37E-17	2.23E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-16	3.63E-16
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.22E-18	9.91E-20	8.23E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-17	8.24E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.10E-20	3.02E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-16	2.95E-16
	C-14	mSv/a	5.25E-14	1.47E-16	0.00E+00	1.72E-14	1.17E-14	2.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-05	1.01E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-13	1.88E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.79E-19	1.07E-18	2.94E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.91E-13	6.92E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-07	1.53E-07
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-23	3.59E-23
	HTO	mSv/a	7.87E-10	0.00E+00	0.00E+00	2.16E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-07	1.22E-07
	I-129	mSv/a	4.00E-16	2.11E-20	0.00E+00	5.23E-17	1.64E-15	1.00E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-11	1.63E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.89E-28	3.17E-29	1.78E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-29	1.78E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-13	1.64E-13
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.80E-17	8.34E-15	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-15	5.08E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.67E-09	4.67E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.21E-20	2.51E-17	3.22E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-16
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-19	2.47E-22	2.70E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-18
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	5.98E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-13	9.40E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	5.18E-13	9.31E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-09	1.83E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.63E-19	1.08E-13	4.11E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.68E-13	8.79E-13
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.97E-22	2.60E-16	2.11E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-15	2.14E-15
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.60E-18	2.02E-19	6.10E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-16	6.38E-16
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	2.02E-25	6.09E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-21	1.71E-21
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.20E-20	1.74E-19	3.64E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-16	4.42E-16
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	1.35E-16	2.73E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.51E-16	2.84E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	1.27E-21	5.62E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-20	9.26E-20
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.07E-17	3.04E-17	4.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-13	3.61E-13
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.31E-20	2.05E-21	1.50E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E-19	2.54E-18
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.67E-25	1.16E-23	2.55E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-22	2.71E-21
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.35E-20	3.59E-17	6.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-17	7.10E-16
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-17	1.58E-16
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.51E-21	1.83E-24	8.94E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-20	1.09E-19
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	1.88E-22	5.49E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-22	5.53E-20
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.40E-19	3.19E-21	5.22E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-18	6.53E-18
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.65E-20	1.65E-16	4.70E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-16	1.47E-15
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.69E-20	5.06E-16	4.53E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-15	3.50E-15
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.54E-17	1.95E-16	4.90E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-16	5.02E-14
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.30E-20	2.63E-16	2.14E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-15	1.80E-15
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.96E-19	1.31E-15	2.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-15	2.61E-13
	Total	**mSv/a**	**7.88E-10**	**1.47E-16**	**0.00E+00**	**2.16E-10**	**6.55E-13**	**9.70E-13**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.04E-05**	**1.04E-05**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	4.62E-16	6.78E-20	8.79E-22	2.73E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.46E-14	1.44E-21	3.37E-17	2.23E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	6.81E-17	3.22E-18	9.91E-20	8.23E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	4.30E-14	2.61E-18	4.10E-20	3.02E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-14

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	C-14	mSv/a	5.25E-14	1.47E-16	3.56E-09	1.72E-14	1.17E-14	2.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.56E-09
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.64E-13	0.00E+00	1.98E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	3.84E-15	1.79E-19	1.07E-18	2.94E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-15
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	4.60E-21	0.00E+00	7.55E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-21
	HTO	mSv/a	7.87E-10	0.00E+00	4.41E-08	2.16E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-08
	I-129	mSv/a	4.00E-16	2.11E-20	4.72E-12	5.23E-17	1.64E-15	1.00E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-12
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.86E-26	5.89E-28	3.17E-29	1.78E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.17E-12	0.00E+00	3.64E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	7.47E-12	2.80E-17	8.34E-15	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.47E-14	1.21E-20	2.51E-17	3.22E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	4.81E-17	2.82E-19	2.47E-22	2.70E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E-17
	Pb-210	mSv/a	0.00E+00	0.00E+00	6.13E-13	3.16E-20	5.98E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	1.98E-08	2.09E-18	5.18E-13	9.31E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	6.41E-11	3.63E-19	1.08E-13	4.11E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.42E-11
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.55E-13	8.97E-22	2.60E-16	2.11E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-13
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.31E-14	1.60E-18	2.02E-19	6.10E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.90E-19	3.72E-23	2.02E-25	6.09E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	6.13E-14	5.20E-20	1.74E-19	3.64E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.88E-14	1.49E-18	1.35E-16	2.73E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.34E-18	3.04E-23	1.27E-21	5.62E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.82E-12	2.07E-17	3.04E-17	4.74E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	5.78E-16	7.31E-20	2.05E-21	1.50E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.80E-16
	Th-228	mSv/a	0.00E+00	0.00E+00	8.86E-20	9.67E-25	1.16E-23	2.55E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-20
	Th-229	mSv/a	0.00E+00	0.00E+00	2.10E-14	4.35E-20	3.59E-17	6.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	1.50E-14	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-14
	Th-231	mSv/a	0.00E+00	0.00E+00	9.07E-18	4.51E-21	1.83E-24	8.94E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.17E-18
	Th-232	mSv/a	0.00E+00	0.00E+00	1.10E-19	2.74E-27	1.88E-22	5.49E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	6.97E-16	1.40E-19	3.19E-21	5.22E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.02E-16
	U-233	mSv/a	0.00E+00	0.00E+00	1.05E-13	2.65E-20	1.65E-16	4.70E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13
	U-234	mSv/a	0.00E+00	0.00E+00	3.22E-13	3.69E-20	5.06E-16	4.53E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-13
	U-235	mSv/a	0.00E+00	0.00E+00	1.24E-13	1.54E-17	1.95E-16	4.90E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-13
	U-236	mSv/a	0.00E+00	0.00E+00	1.67E-13	1.30E-20	2.63E-16	2.14E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-13
	U-238	mSv/a	0.00E+00	0.00E+00	8.35E-13	5.96E-19	1.31E-15	2.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-12
	Total	**mSv/a**	**7.88E-10**	**1.47E-16**	**6.75E-08**	**2.16E-10**	**6.55E-13**	**9.70E-13**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**6.85E-08**

5.2.6.2 Non-Radiological Exposure Concentrations and Doses

As discussed in Section 5.1.2.2, the relevant COPCs for human health in the post-closure phase are cadmium and lead.

The exposure point concentrations for the human receptors identified based on maximum predicted loadings from groundwater are shown in Table 5-15 and the exposure doses are shown in Table 5-16 through Table 5-18 for the harvester, On-site Farm, and Farm A, respectively.

To estimate the on-site soil concentrations during post-closure, the soil model as per CSA N288.1-14 (2014) was used. The soil model factors in irrigation rates as well as loss rates due to erosion, volatilization, and leaching.

The Harvester and receptors at the On-site Farm and Farm A were assumed to be exposed to surface water from the Winnipeg River which has a Project contribution and a background contribution to the total surface water concentration. As part of the routine monitoring at the WL site, water in the Winnipeg River at the WL intake is monitored for a variety of metals (CNL 2016c). The WL intake is located in the river at the WL site, upstream of any potential site-associated influence. It represents ambient water quality for the Winnipeg River exclusive of any potential WL site related influence.

As shown in Table 5-15, the background concentrations of cadmium and lead in the Winnipeg River dominate over the Project contribution via groundwater to river water concentrations. Overall, the contribution of the Project to the river water concentrations of cadmium and lead at the location 50 m downstream where the groundwater mixes with the Winnipeg River is approximately 0.042% and 0.002% respectively.

Exposure doses to human receptors exposed to cadmium and lead in surface water are calculated based on total concentrations (background plus Project contribution) and based on Project contributions only, as shown in Table 5-16 through Table 5-18.

Table 5-15: Exposure Point Concentrations for Non-Radiological COPCs for Human Receptors during Post-Closure

Non-radionuclide	Groundwater Concentration (µg/L)	Background Concentration (µg/L)	Project Contribution to River Concentrations at Groundwater Seep at River Bottom (µg/L)	River Concentration at Groundwater Seep at River Bottom (µg/L)	Project Contribution to River Concentrations at Groundwater Seep - 50 m Downstream (µg/L)	River Concentration at Groundwater Seep - 50 m Downstream (µg/L)	Project Contribution to River Concentration at Farm A Intake (µg/L)	River Concentration at Farm A Intake (µg/L)
Cadmium	5.35E+00	1.00E-02	3.59E-05	1.00E-02	4.15E-06	1.00E-02	7.80E-08	1.00E-02
Lead	7.27E+01	2.60E+00	4.89E-04	2.60E+00	5.64E-05	2.60E+00	1.06E-06	2.60E+00

Table 5-16: Doses to Harvester during Post-Closure

Human Type	Non-radionuclide	Unit	Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total
Total River Contribution (Dose by Pathway)							
Adult	Cadmium	mg/kg bw/day	1.40E-07	6.09E-07	1.45E-05	2.94E-06	1.82E-05
	Lead	mg/kg bw/day	6.48E-06	1.13E-05	2.63E-05	2.02E-04	2.46E-04
Toddler	Cadmium	mg/kg bw/day	1.46E-07	3.93E-07	9.35E-06	4.14E-06	1.40E-05
	Lead	mg/kg bw/day	6.79E-06	7.28E-06	1.70E-05	1.08E-04	1.39E-04
WRDF Project Contribution (Dose by Pathway)							
Adult	Cadmium	mg/kg bw/day	2.95E-11	1.29E-10	3.06E-09	6.22E-10	3.84E-09
	Lead	mg/kg bw/day	7.16E-11	1.25E-10	2.91E-10	8.45E-10	1.33E-09
Toddler	Cadmium	mg/kg bw/day	3.09E-11	8.30E-11	1.98E-09	8.75E-10	2.97E-09
	Lead	mg/kg bw/day	7.51E-11	8.05E-11	1.88E-10	1.19E-09	1.53E-09

Table 5-17: Doses to New On-site Farm during Post-Closure

Human Type	Non-radionuclide	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	7.73E-05	1.22E-09	6.98E-11	7.72E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	7.74E-05
	Lead	mg/kg bw/day	2.01E-02	1.50E-07	8.58E-08	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	2.01E-02
Toddler	Cadmium	mg/kg bw/day	1.32E-04	2.10E-08	1.36E-10	1.65E-09	2.48E-09	1.17E-07	1.04E-09	6.73E-09	5.01E-09	2.08E-09	7.51E-09	0.00E+00	1.33E-04
	Lead	mg/kg bw/day	3.44E-02	2.58E-06	1.67E-07	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.44E-02
WRDF Project Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	3.20E-08	5.08E-13	2.90E-14	3.20E-13	9.79E-13	4.63E-11	1.04E-12	3.06E-12	2.74E-12	1.82E-12	3.76E-13	1.83E-14	3.21E-08
	Lead	mg/kg bw/day	4.36E-07	1.63E-13	9.30E-14	1.03E-13	9.32E-14	1.13E-10	1.51E-12	2.55E-11	8.59E-13	1.26E-11	4.65E-12	2.55E-14	4.36E-07
Toddler	Cadmium	mg/kg bw/day	5.49E-08	8.71E-12	5.65E-14	6.87E-13	1.03E-12	4.86E-11	4.31E-13	2.79E-12	2.08E-12	8.61E-13	3.11E-12	0.00E+00	5.50E-08
	Lead	mg/kg bw/day	7.47E-07	2.80E-12	1.81E-13	2.21E-13	9.81E-14	1.18E-10	6.23E-13	2.33E-11	6.53E-13	5.98E-12	3.85E-11	0.00E+00	7.47E-07

Table 5-18: Doses to Farm A during Post-Closure

Human Type	Non-radionuclide	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	7.72E-05	1.22E-09	6.98E-11	7.72E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	7.74E-05
	Lead	mg/kg bw/day	2.01E-02	1.50E-07	8.58E-08	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	2.01E-02
Toddler	Cadmium	mg/kg bw/day	1.32E-04	2.10E-08	1.36E-10	1.65E-09	2.48E-09	1.17E-07	1.04E-09	6.72E-09	5.01E-09	2.07E-09	7.50E-09	0.00E+00	1.33E-04
	Lead	mg/kg bw/day	3.44E-02	2.58E-06	1.67E-07	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.44E-02
WRDF Project Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	6.03E-10	9.55E-15	6.77E-15	6.02E-15	1.84E-14	8.71E-13	1.96E-14	5.76E-14	5.15E-14	3.42E-14	7.07E-15	3.44E-16	6.04E-10
	Lead	mg/kg bw/day	8.19E-09	3.07E-15	1.75E-15	1.93E-15	1.75E-15	2.12E-12	2.84E-14	4.80E-13	1.62E-14	2.38E-13	8.74E-14	4.80E-16	8.20E-09
Toddler	Cadmium	mg/kg bw/day	1.03E-09	1.64E-13	1.06E-15	1.29E-14	1.94E-14	9.14E-13	8.10E-15	5.25E-14	3.91E-14	1.62E-14	5.86E-14	0.00E+00	1.03E-09
	Lead	mg/kg bw/day	1.40E-08	5.26E-14	3.41E-15	4.14E-15	1.84E-15	2.22E-12	1.17E-14	4.38E-13	1.23E-14	1.13E-13	7.24E-13	0.00E+00	1.40E-08

5.2.7 Uncertainties in Exposure Assessment

The IMPACT™ model was used to predict dose to identified human receptors during the post-closure phase. The IMPACT™ model used is a steady state model; however, it includes time dependent equations to account for buildup in soil from irrigation, for all radionuclides released.

It includes progeny buildup through use of progeny inclusive dose coefficients. Forty years of ingrowth was used to develop the progeny inclusive dose coefficients for each radionuclide, which is the timeframe used in CSA N288.1-14 for development of progeny-inclusive dose coefficients for sediment and soil exposure. Exposure factors were based on best-available information from literature with preference for exposure factors identified in CSA N288.1-14 (2014). For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6.

Atmospheric releases that occurred during closure that are dispersed and subsequently deposited on the ground or transported to a groundwater well near the WL site are not considered during the post-closure phase. The soil (internal and external) pathways and drinking water pathway (from a farm well) have small contributions to total dose during the closure phase and would have minimal impact on the total dose for the post-closure phase. Therefore, it was decided to assess the two phases separately to understand the effects of each phase of the Project separately.

5.3 Toxicity Assessment

5.3.1 Toxicological Reference Values (TRVs)

TRVs may include slope factors and unit risks for carcinogens, and reference doses, tolerable daily intake, or acceptable daily intake for non-carcinogens. TRVs are used in the risk characterization to determine Incremental Lifetime Cancer Risks (ILCRs) for carcinogenic substances and Hazard Quotients (HQs) for non-carcinogenic substances. A non-carcinogenic substance is known as a threshold substance because an adverse health effect may occur in the human receptor when exposure exceeds a specific threshold dose. A carcinogenic substance is known as a non-threshold substance because an adverse health effect in a human receptor can occur at any dose.

The non-radiological COPCs relevant to human health for the post-closure assessment are cadmium and lead, which are both considered to be non-carcinogenic substances.

A summary of the TRVs selected for cadmium and lead are presented in Table 5-19. The selected TRV for cadmium is from Health Canada (2010b) and is an oral tolerable daily intake (TDI) value of 0.001 mg/kg-day, based on epidemiological studies in humans from WHO (1972) and Friberg et al. (1971). The critical health effect was renal tubular dysfunction manifested by low molecular weight proteinuria. No uncertainty factors have been incorporated into the cadmium TRV.

The TRV for lead from Health Canada is currently under review. There is no lead TRV from the Government of Manitoba. The selected TRV for lead is from the Ontario Ministry of the Environment and Energy (1994) and is an oral intake of concern (IOC) value of 0.00185 mg/kg-day. Child IQ tests have been used to measure the adverse effect of lead on neurological development. Neurological development in children is affected by blood lead levels. The Ontario Ministry of the Environment (OMOE) (1994) noted a statistically significant adverse effect at a blood lead level of 10 µg/dL, corresponding to lead exposure at 3.7 µg/kg body weight/day. The OMOE used half this level (1.85 µg/kg body weight/day) as a threshold for adverse effects on neurological development.

Table 5-19: Selected Human Toxicity Reference Values for Non-Radiological Chemical COPCs

Non-radionuclide	Selected Oral TRV (TDI) (mg/kg bw/day)	TDI (mg/kg bw/day)				
		HC (2010b)	MOE (2011)	EPA IRIS	Other	Source
Cadmium	1.00E-03	1.00E-03	3.20E-05	1.00E-03	NA	-
Lead	1.85E-03	NV	NV	NV	1.85E-03	OMOE 1994

5.3.2 Radiation Dose Limits and Targets

The public dose limit for radiation protection is 1 mSv/a, as described in the Radiation Protection Regulations under the *Nuclear Safety and Control Act*. This limit is defined as an incremental dose. It is set at a fraction of natural background exposure to radiation. Public doses arising from licensed facilities are compared to the public dose limit and higher doses are considered unacceptable.

For the WL Project, a dose constraint of 0.25 mSv/a has been defined.

5.3.3 Uncertainties in the Toxicity Assessment

Recent science on health risks from lead exposure indicate that there is no threshold level of blood lead at which adverse effects begin to occur. Statistically significant effects on IQ have been observed at blood lead levels below 5 µg/dL and possibly as low as 1 to 2 µg/dL. Health Canada (2013) has indicated that the threshold approach for assessing health risks from lead exposure is no longer appropriate, and that their previously used TRV (thresholds for effect) should no longer be used; however, an updated TRV has not yet been developed. In the absence of additional information, the TRV from OMOE (1994) has been applied.

The OMOE (1994) has applied an uncertainty factor of 2 in derivation of the lead TRV. Health Canada (2010b) has not applied an uncertainty factor in derivation of the cadmium TRV.

5.4 Risk Characterization

5.4.1 Risk Estimation

5.4.1.1 Risk Estimation for Radiological COPCs

For radionuclides, the total doses are compared to the public dose limit of 1 mSv/a, and the dose constraint for the Project of 0.25 mSv/a. A summary of the total dose for each receptor and age group is provided in Table 5-20 along with a comparison to the public dose limit and dose constraint.

The total dose is presented, including the existing background contribution of Cs-137 in sediment, as well as looking at Project contributions only.

Table 5-20: Summary of Total Dose for Post-Closure Human Receptors and Comparison to Limits

Age Group	Dose (mSv/a)					
	On-Site Farm		Farm A		Harvester	
	Total (including background Cs-137)	Project only*	Total (including background Cs-137)	Project only*	Total (including background Cs-137)	Project only*
Adult	3.24E-03	5.06E-05	3.35E-04	9.51E-07	4.75E-05	3.01E-05
Child	3.25E-03	5.64E-05	3.36E-04	1.06E-06	3.05E-05	2.45E-05
Infant (nursing)	4.23E-03	7.90E-05	4.37E-04	1.48E-06	2.00E-05	1.76E-05
Infant (formula)	4.18E-03	2.14E-05	4.36E-04	4.03E-07	-	-
3 month old (nursing)	5.48E-04	5.46E-04	1.04E-05	1.03E-05	-	-
3 month old (formula)	3.65E-06	3.65E-06	6.85E-08	6.85E-08	-	-

Notes:
Shaded cells indicate exceedance of the public dose limit of 1 mSv/a and bold cells indicate exceedance of the dose constraint of 0.25 mSv/a.
*Project dose results exclude the existing background contribution from Cs-137 present in sediment.

5.4.1.2 Risk Estimation for Non-Radiological COPCs

In order to characterize potential risks due to chemical COPCs quantitatively, the results of the exposure and toxicity assessments were used to estimate HQs for each receptor. HQs were estimated for non-carcinogenic substances using a threshold TRV as follows:

Hazard Quotient = Estimated Exposure / Toxicity Reference Value

These HQs were compared to a target value of 0.2 per medium, as recommended by Clause 6.5.2.6 in CSA N288.6-12. The hazard quotients and a comparison to the target level are provided in Table 5-21 through Table 5-23.

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Table 5-21: Hazard Quotients for Harvester during Post-Closure

Human Type	Non-radionuclide	Total River Contribution (HQ by Pathway)					WRDF Project Contribution (HQ by Pathway)				
		Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total	Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total
Adult	Cadmium	1.40E-04	6.09E-04	1.45E-02	2.94E-03	1.82E-02	2.95E-08	1.29E-07	3.06E-06	6.22E-07	3.84E-06
	Lead	3.50E-03	6.10E-03	1.42E-02	1.09E-01	1.33E-01	3.87E-08	6.74E-08	1.57E-07	4.57E-07	7.20E-07
Toddler	Cadmium	1.46E-04	3.93E-04	9.35E-03	4.14E-03	1.40E-02	3.09E-08	8.30E-08	1.98E-06	8.75E-07	2.97E-06
	Lead	3.67E-03	3.93E-03	9.17E-03	5.82E-02	7.49E-02	4.06E-08	4.35E-08	1.01E-07	6.43E-07	8.28E-07

Notes:
Bold and shaded values indicate HQ greater than 0.2.

Table 5-22: Hazard Quotients for New On-site Farm during Post-Closure

Human Type	Non-radionuclide	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (HQ by Pathway)														
Adult	Cadmium	7.73E-02	1.22E-06	6.98E-08	7.72E-07	2.36E-06	1.12E-04	2.52E-06	7.38E-06	6.60E-06	4.38E-06	9.06E-07	4.41E-08	7.74E-02
	Lead	**1.09E+01**	8.13E-05	4.64E-05	5.13E-05	4.64E-05	2.80E-03	3.87E-05	6.54E-04	2.18E-05	3.24E-04	1.18E-04	6.49E-07	**1.09E+01**
Toddler	Cadmium	1.32E-01	2.10E-05	1.36E-07	1.65E-06	2.48E-06	1.17E-04	1.04E-06	6.73E-06	5.01E-06	2.08E-06	7.51E-06	0.00E+00	1.33E-01
	Lead	**1.86E+01**	1.39E-03	9.04E-05	1.10E-04	4.89E-05	2.94E-03	1.60E-05	5.96E-04	1.66E-05	1.53E-04	9.81E-04	0.00E+00	**1.86E+01**
WRDF Project Contribution (HQ by Pathway)														
Adult	Cadmium	3.20E-05	5.08E-10	2.90E-11	3.20E-10	9.79E-10	4.63E-08	1.04E-09	3.06E-09	2.74E-09	1.82E-09	3.76E-10	1.83E-11	3.21E-05
	Lead	2.36E-04	8.82E-11	5.03E-11	5.56E-11	5.04E-11	6.08E-08	8.16E-10	1.38E-08	4.64E-10	6.83E-09	2.51E-09	1.38E-11	2.36E-04
Toddler	Cadmium	5.49E-05	8.71E-09	5.65E-11	6.87E-10	1.03E-09	4.86E-08	4.31E-10	2.79E-09	2.08E-09	8.61E-10	3.11E-09	0.00E+00	5.50E-05
	Lead	4.04E-04	1.51E-09	9.81E-11	1.19E-10	5.30E-11	6.38E-08	3.37E-10	1.26E-08	3.53E-10	3.23E-09	2.08E-08	0.00E+00	4.04E-04

Notes:
Bold and shaded values indicate HQ greater than 0.2.

Table 5-23: Hazard Quotients for Farm A during Post-Closure

Human Type	Non-radionuclide	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (HQ by Pathway)														
Adult	Cadmium	7.72E-02	1.22E-06	6.98E-08	7.72E-07	2.36E-06	1.12E-04	2.52E-06	7.38E-06	6.60E-06	4.38E-06	9.06E-07	4.41E-08	7.74E-02
	Lead	**1.09E+01**	8.13E-05	4.64E-05	5.13E-05	4.64E-05	2.80E-03	3.87E-05	6.54E-04	2.18E-05	3.24E-04	1.18E-04	6.49E-07	**1.09E+01**
Toddler	Cadmium	1.32E-01	2.10E-05	1.36E-07	1.65E-06	2.48E-06	1.17E-04	1.04E-06	6.72E-06	5.01E-06	2.07E-06	7.50E-06	0.00E+00	1.33E-01
	Lead	**1.86E+01**	1.39E-03	9.04E-05	1.10E-04	4.89E-05	2.94E-03	1.60E-05	5.96E-04	1.66E-05	1.53E-04	9.81E-04	0.00E+00	**1.86E+01**
WRDF Project Contribution (HQ by Pathway)														
Adult	Cadmium	6.03E-07	9.55E-12	6.77E-12	6.02E-12	1.84E-11	8.71E-10	1.96E-11	5.76E-11	5.15E-11	3.42E-11	7.07E-12	3.44E-13	6.04E-07
	Lead	4.43E-06	1.66E-12	9.45E-13	1.05E-12	9.46E-13	1.14E-09	1.53E-11	2.60E-10	8.73E-12	1.28E-10	4.73E-11	2.59E-13	4.43E-06
Toddler	Cadmium	1.03E-06	1.64E-10	1.06E-12	1.29E-11	1.94E-11	9.14E-10	8.10E-12	5.25E-11	3.91E-11	1.62E-11	5.86E-11	0.00E+00	1.03E-06
	Lead	7.59E-06	2.84E-11	1.84E-12	2.24E-12	9.97E-13	1.20E-09	6.33E-12	2.37E-10	6.64E-12	6.08E-11	3.92E-10	0.00E+00	7.59E-06

Notes:
Bold and shaded values indicate HQ greater than 0.2.

5.4.2 Discussion of Chemical and Radiation Effects

5.4.2.1 Likelihood of Effects

Radiological Effects

For the harvester and On-site Farm and Farm A residents, the total radiation dose during the post-closure phase is well below the public dose limit of 1 mSv/a, and the dose constraint for the Project of 0.25 mSv/a, as shown in Table 5-20. Since the dose estimates are a small fraction of the public dose limit, no discernable health effects are anticipated due to exposure of these receptors to radioactive releases from the WL site during post-closure.

The dominant pathway for both the On Site Farm as well as for Farm A is from Cs-137 through external exposure to sediment for the adult and 10-year old child – this is due to the existing background concentration of Cs-137 in sediment and is not associated with any effluent from the Project. Looking at Project contributions only, the radionuclide with the greatest contribution to the total dose is C-14 mainly through the consumption of terrestrial animals. For 3-month-old infants, in both farm locations, the dominant uptake pathway is C-14 through breast milk for the nursing infant and HTO in water for the formula consuming infant. In the case of the harvester, the majority of the dose is accounted for by C-14 through consumption of terrestrial animals or aquatic animals.

The Project dose is based on the maximum mass loadings for each COPC provided in the solute and transport model. For COPCs that did not reach a peak loading rate in the specified time frame, the simulations were extended until the peak loading rate could be determined. For C-14, the time of maximum mass loadings to the Winnipeg River occurs at year 1,006.

The maximum dose for each radionuclide was assessed at a single point in time, corresponding to the peak loading rate from groundwater to the Winnipeg River. However, the Project dose for each human receptor was extrapolated over the groundwater modelling timeframe based on the ratio of dose to mass loadings over time, as presented in Figure 5-5. The dose increases steadily with time, generally peaking around 1,000 years after closure due to contribution from C-14. The pattern is slightly different for the 3 month old formula-fed infant where the dose peaks at the beginning of modelling and then again after 100,000 years. This is because the dose from tritium peaks towards the beginning of the modelling timeframe, and the dose from polonium-210 peaks after 100,000 years. As presented in Figure 5-6, the main contributors to total dose for the 3 month old nursing infant include tritium, carbon-14, neptunium-237, and polonium-210. The dose contribution from tritium is greatest at the beginning of modelling, then is dominated by carbon-14, until later in the modelling period where the main contributors to total dose are from neptunium-237 and polonium-210.

Non-Radiological Effects

The HQs for the harvester are below the acceptable risk level of 0.2 for cadmium and lead for all pathways for the toddler and adult. The HQs for the On-site Farm and Farm A are below the acceptable risk level of 0.2 for cadmium and lead for all pathways, with the exception of lead from drinking water from the Winnipeg River. The HQs for all receptors are based on background plus Project exposure. If only the Project contribution is considered, the HQs for the toddler and adult for the On-site Farm and Farm A are well below the acceptable risk level of 0.2. The Project contribution to the lead HQ for drinking water is 0.002%. This indicates that the Project contribution to the total HQ is negligible and the exceedance is from existing background concentrations of lead in the Winnipeg River.

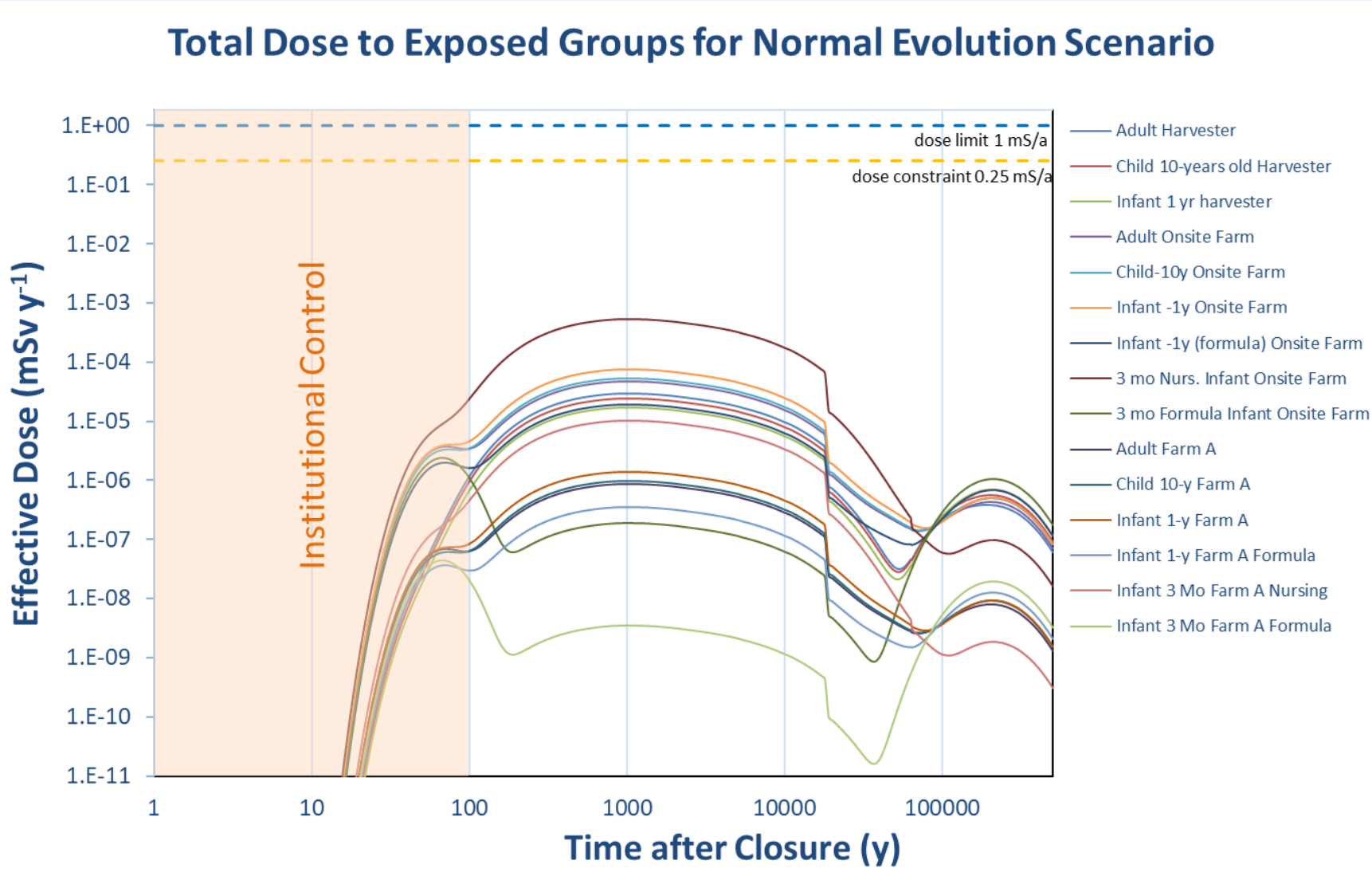

Figure 5-5: Estimated Total Project Dose to Human Receptors over the Post-Closure Phase

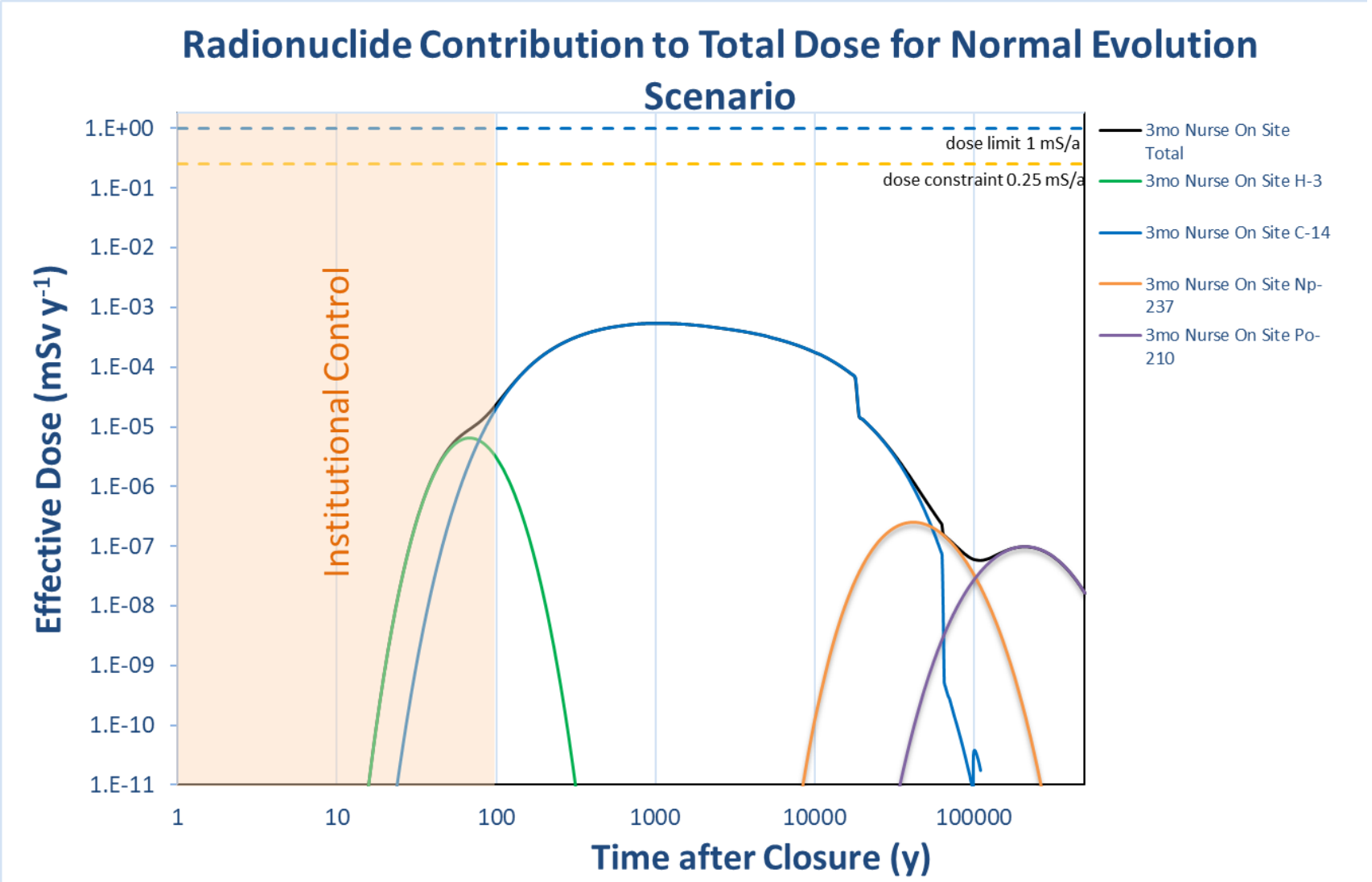

Figure 5-6: Estimated Contribution of Radionuclides to Total Dose of 3 Month Old Nursing Infant over the Post-Closure Phase

5.4.3 Uncertainties in the Risk Characterization

The uncertainties in the characterization of risk consist of those in the exposure and toxicity assessments (Sections 5.2 and 5.3), since these two assessments are the inputs to the risk characterization.

The Project dose is based on the maximum mass loadings for each COPC provided in the solute transport model. The maximum dose for each radionuclide was assessed at a single point in time, corresponding to the peak loading rate from groundwater to the Winnipeg River. For COPCs that did not reach a peak loading rate in the specified modelling time frame of 500,000 years, the simulations were extended until the peak loading rate could be determined, as described further below.

Five radionuclides (Nb-94, Ra-224, Ra-228, Th-228, and Th-232) and eight non-radionuclides (barium, chromium, copper, mercury, nickel, lead, samarium, and zirconium) did not achieve maximum loadings before 500,000 years (Table 5-24). The groundwater flow and solute transport model was run again without the 500,000 year constraint to determine the peak mass loadings, which is reflected in the source-term used in the ERA. Some of these radionuclides and non-radionuclides do not reach peak mass loadings until well past 500,000 years. For example, lead reaches peak mass loadings after 5,596,000 years, which adds conservatism to the assessment.

The uncertainties from the exposure assessment include model uncertainty and uncertainty in the exposure factors selected. The uncertainties from the toxicity assessment include conservatisms built into the selected TRVs and the radiation dose constraint. Taken together, the approaches to exposure and toxicity assessment have ensured that the characterization of dose and risk has been undertaken in a manner that has not underestimated risk.

Table 5-24: Comparison of Maximum Loadings from the 500,000 year to the more than 500,000 years Model Runs

Non-radionuclide	Lowest Criteria (µg/L or Bq/L)	Run to 500,000 years			Run more than 500,000 years			
		Maximum Loading (g/yr)	Groundwater Concentration (µg/L or Bq/L)	Exceeds Screening Criteria	Maximum Loading (g/yr.)	Time to Reach Peak (yr.)	Groundwater Concentration (µg/L or Bq/L) *	Exceeds Screening Criteria
Barium	0.4	1.49E-23	2.15E-22	No	1.82E-08	1.07E+07	2.62E-07	No
Chromium	1	4.95E-27	7.14E-26	No	2.42E-03	2.00E+07	3.49E-02	No
Copper	2	1.96E-04	2.83E-03	No	5.47E-04	8.76E+05	7.89E-03	No
Mercury	0.026	1.37E-18	1.98E-17	No	4.16E-05	6.55E+06	6.00E-04	No
Nb-94	NA	1.55E-21	1.55E-16	NA	6.43E-21	6.46E+05	6.44E-16	NA
Nickel	25	2.01E-05	2.90E-04	No	4.81E-05	8.40E+05	6.94E-04	No
Lead	0.99	2.52E-01	3.63E+00	**Yes**	5.05E+00	5.60E+06	7.27E+01	**Yes**
Ra-224	NA	6.66E-22	5.70E-11	NA	6.67E-22	1.90E+06	5.71E-11	NA
Ra-228	NA	3.89E-19	5.71E-11	NA	3.90E-19	9.36E+05	5.73E-11	NA
Samarium	0.74	0	0	No	3.65E-12	2.00E+07	5.26E-11	No
Th-228	NA	2.83E-20	1.24E-11	NA	2.84E-20	1.09E+06	1.24E-11	NA
Th-232	NA	2.12E-10	1.24E-11	NA	2.12E-10	6.32E+05	1.24E-11	NA
Zirconium	4	0	0	No	1.51E-10	2.00E+07	2.18E-09	No

Notes:
* Concentration assumes the same groundwater flow as the 10,000 to 500,000 years period.

6.0 ECOLOGICAL RISK ASSESSMENT - CLOSURE

6.1 Problem Formulation

6.1.1 Receptor Selection and Characterization

It is generally an impractical task to assess the effect of radiological and non-radiological emissions on all the species of biota within a natural ecosystem, and specifically within the ecosystem around the WL site. Therefore, representative organisms are chosen for dose and risk analysis. These organisms are selected because they are known to exist on the site, and within the Winnipeg River, and are representative of major taxonomic groups or exposure pathways, or have a special importance or value. These organisms are known as Valued Components (VCs). VCs were selected based on existing information from the Comprehensive Study Report (AECL 2001). Stakeholder and public input into VC selection were also considered.

The VCs selected for the closure assessment are based on a number of considerations:

- VCs or species identified, studied or sampled in previous reports:
    - Atomic Energy of Canada Limited (AECL). 2001. Appendix G: Whiteshell Laboratories Decommissioning Project, Comprehensive Study Report, Volumes 1: Main Report. Atomic Energy of Canada Limited, WLDP-30702-041-000, REV 2, March 2001.
    - Canadian Nuclear Laboratories (CNL) Environmental Monitoring at Whiteshell Laboratories Annual Safety Reports for 2011 to 2015.
    - CNL. 2016a. Environmental Assessment (and/or Environmental Effects Review). *In Situ* Decommissioning of the WR-1 Reactor at the Whiteshell Laboratories Site, WLDP-03700-ENA-001, Revision 0, April 2016.
    - CNL. 2016d. Memo: Results of 2015 bat survey at Whiteshell Labs. From: M. Murrant To: L. Wilson, K. Ross. Dated: 2016/10/07.
- The habitat and land use of the Study Area;
- Exposure pathways;
- Lists of threatened and endangered species under the federal Species at Risk Act (SARA), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Manitoba Endangered Species and Ecosystems Act (ESEA) that are likely to be present in the vicinity of the site or the Winnipeg River;

- Master list of species sightings reported by Whiteshell Staff between 2014 and 2016 in relation to the Study Area;
- Ecological and socio-economic significance;
- Traditional and cultural importance – since the Revision 1 of the ERA was submitted in 2017, additional information from Indigenous Engagement was available on potential VCs and used in the assessment, including;
    - Sagkeeng Anicinabe Land use and Occupancy Study (Olson and Firelight Research Inc 2018);
    - Manitoba Métis Traditional Knowledge, Land Use, and Occupancy Study (Shared Value Solutions 2019);
    - Indigenous Food Intake Survey (CNL 2018a);
- The suggested criteria listed in Table 7.1 of CSA N288.6 (2012); and
- Professional judgement.

During closure, the focus is on terrestrial VCs because releases are only expected via atmospheric pathways. VCs selected for the post-closure phase are presented in Section 7.1.1.

The terrestrial habitat for the Study Area consists of wetland areas to the east of the site and forest species and abandoned farm fields vegetated with grasses and shrubs to the west of the site (CNL 2016a). Although Black Spruce is the common plant species in the easterly portions of the site, Jack Pine is also present in this area along a ridge of well drained sandy soil (AECL 2001). The forest species to the west of the site consist of ash and poplar growing in poorly drained clay plains (AECL 2001).

Mammalian species that are common and widespread in the area include the snowshoe hare, American red squirrel, meadow vole, red fox and white-tailed deer. Not only is the white-tailed deer present on-site, the white-tailed deer have also established a wintering area on-site. The white-tailed deer is considered to be an important species for the traditional communities and game species in the area (AECL 2001).

A bat survey conducted in 2015 at the site indicated that bats were not roosting within buildings at the site but rather roosting in the forested areas of the site (CNL 2016d).

Bird migratory staging areas are present on and near the site. The Winnipeg River is an important migratory corridor for many bird species including the common loon, red-necked grebe, horned grebe, double-crested cormorant, American white pelican, Bonaparte's gull, common tern, Caspian tern, lesser scaup, great scaup and bald eagle (AECL 2001).

The VCs selected for assessment during the closure phase are provided in Table 6-1 along with their rationale for inclusion, consistent with suggested criteria in CSA N288.6-12 (2012). The VCs were selected to represent each major plant and animal group, reflecting the main ecological exposure pathways, feeding habits and habitats at or around the site. In making the selection, species that were ecologically similar to other species and could be represented by another species, were not selected, in order to reduce redundancy in the exposure calculations. Further descriptions regarding the chosen VCs, such as habitat and feeding habits, are provided in Appendix A.

Table 6-1: VCs Selected for the Closure Phase

Organism Category	Species	Selection Criteria				Applicable Selection Criteria	Scenario
		1 Major Plant or Animal Group	2 Facility or Stakeholder Importance	3 Socio-economic/ ecological Significance	4 Exposed to and/or Sensitive to Stressor		
Terrestrial Invertebrates	Earthworm	Soil dwelling - detritivore	Present on-site		Exposed to atmospheric release through soil	Selected as VC based on: 1, 2, 4	Closure
Terrestrial Birds	American Robin	Ground feeding insectivore	Present on-site	On-site breeder. A surrogate for aquatic insect eating birds including some SAR under COSEWIC, ESEA or SARA (e.g. the Bobolink and Red-headed Woodpecker)	Exposed to atmospheric release through the ingestion of soil invertebrates	Selected as VC: 1, 2, 3, 4	Closure
	Loggerhead Shrike	Aerial diving carnivore	Present on-site	Identified as a SAR under COSEWIC, ESEA and SARA. A surrogate for other predatory birds identified as SAR under COSEWIC, ESEA or SARA (e.g. Peregrine Falcon and Short Eared Owl)	Exposed to atmospheric release through the ingestion of soil invertebrates, small mammals and birds	Selected as VC: 1, 2, 3, 4	Closure
Terrestrial Plants	Grass and shrubs	Grasses	Present on-site	A food source for other VCs	Exposed to atmospheric release through soil	Selected as VC: 1, 2, 3, 4	Closure
	Berries	Fruit bearing trees or shrubs	Present in area (during growing season)	A food source for other VCs and human receptors			
Mammals	Meadow Vole	Herbivore	Common and widespread around the site	A food source for other VCs	Exposed to atmospheric release through ingestion of terrestrial plants	Selected as VC: 1, 2, 3, 4	Closure

Organism Category	Species	Selection Criteria				Applicable Selection Criteria	Scenario
		1 Major Plant or Animal Group	2 Facility or Stakeholder Importance	3 Socio-economic/ ecological Significance	4 Exposed to and/or Sensitive to Stressor		
	Common Shrew	Insectivore	Locally common	A food source for other VCs.	Exposed to atmospheric release through ingestion of soil invertebrates	Selected as VC: 1, 2, 3, 4	Closure
	Snowshoe Hare	Herbivore	Common and widespread around the site	A food source for other VCs. A game species	Exposed to atmospheric release through ingestion of terrestrial plants	Selected as VC: 1, 2, 3, 4	Closure
	White-tailed Deer	Herbivore	Common and widespread around the site. Over winters on-site. Identified as VC in AECL (2001)	A game species. An important game species for Traditional Communities and surrogate for moose	Exposed to atmospheric release through ingestion of terrestrial plants	Selected as VC: 1, 2, 3, 4	Closure
	Red Fox	Carnivore	Common and widespread around the site. Present on-site	A surrogate for the Grey Fox identified as a SAR under COSEWIC and SARA. Fox are commonly trapped in the Whiteshell game hunting area	Exposed to atmospheric release through the ingestion of small mammals and birds	Selected as VC: 1, 2, 3, 4	Closure
	Little Brown Myotis (Bat)	Insectivore	Present on-site. Bats observed roosting in forested areas of the site	Identified as a SAR under COSEWIC, ESEA and SARA. A surrogate for the Northern Myotis identified as SAR under COSEWIC, ESEA and SARA	Exposed to atmospheric release through ingestion of soil invertebrates.	Selected as VC: 1, 2, 3, 4	Closure

6.1.1.1 Consideration of Species at Risk

Table 6-2 lists a number of threatened and endangered species under the federal Species at Risk Act (SARA), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Manitoba Endangered Species and Ecosystems Act (ESEA) that are likely to be present in the vicinity of the site or the Winnipeg River. The possible presence of these species on the site was indicated by the Manitoba Conversation Data Centre (CNL 2016a). Species at risk are also discussed in the EIS (Section 6.6).

Several species that have a Species at Risk Status under SARA, COSEWIC and ESEA have also been sighted on-site. The last date that these species were observed on the site by Whiteshell Staff is presented in Table 6-2.

Species at risk were considered as part of the VC selection. They can be difficult to include in dose and risk calculations due to incomplete knowledge of their exposure factors. While not all SAR are specifically assessed, an effort was made to ensure that the selected VCs include species with similar feeding habits, so that surrogate species from the VC list can be used to infer dose and risk for the SAR species either present or potentially present on the WL site. The surrogate selection is discussed in more detail in Appendix A.

Table 6-2: Status and Date Last Observed for Identified Species at Risk

Species	Status			Last Year Observed On-Site
	COSEWIC	ESEA	SARA	
Birds				
Bank Swallow (*Riparia riparia*)	Threatened	Not Listed	Not Listed	
Barn Swallow (*Hirundo rustica*)	Threatened	Not Listed	Not Listed	2016
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Not Listed	Not Listed	
Canada Warbler (*Wilsonia Canadensis*)	Threatened	Threatened	Threatened	
Chimney Swift (*Chaetura Pelagica*)	Threatened	Threatened	Threatened	
Common Nighthawk (*Chordeiles minor*)	Special Concern	Threatened	Threatened	
Eastern Wood pewee (*Contopus virens*)	Special concern	Not Listed	Special Concern	
Golden-winged Warbler (*Vermivora chrysoptera*)	Threatened	Threatened	Threatened	
Horned Grebe (*Podiceps auritus*)	Special Concern	Not Listed	Special Concern	
Least Bittern (*Ixobrychus exilis)*	Threatened	Endangered	Threatened	
Loggerhead Shrike (*Lanius ludovicianus*)	Threatened	Endangered	Endangered	2014
Olive-sided Flycatcher (*Contopus cooperi*)	Special Concern	Threatened	Threatened	
Peregrine Falcon (*Falco peregrinus*)	Not at Risk	Endangered	Special Concern	
Piping Plover (*Charadrius melodus*)	Endangered	Endangered	Endangered	
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Endangered	Threatened	Threatened	2014
Short Eared Owl (*Asio flammeus*)	Special Concern	Threatened	Special Concern	
Trumpeter Swan (*Cygnus buccinators*)	Not at Risk	Endangered	Not Listed	2015
Whip-poor-will (*Antrostomus vociferous*)	Threatened	Threatened	Threatened	
Yellow Rail (*Coturnicops noveboracensis*)	Special Concern	Not Listed	Special Concern	
Fish				
Chestnut Lamprey (*Ichthyomyzon castaneus*)	Non-Active	Not Listed	Special Concern	
Carmine Shiner (*Notropis percobromus*)	Endangered	Not Listed	Threatened	
Lake Sturgeon (*Acipenser Fulvescens*)	Endangered	Not Listed	Not Listed	
Mammals				

Species	Status			Last Year Observed On-Site
	COSEWIC	ESEA	SARA	
Grey Fox (*Urocyon cinereoargenteus*)	Not Listed	Not Listed	Threatened	
Little Brown Myotis (*Myotis lucifugus*)	Endangered	Endangered	Endangered	
Northern Myotis (*Myotis septentrionalis*)	Endangered	Endangered	Endangered	
Reptiles				
Snapping Turtle (*Chelydra serpentine*)	Special Concern	Not Listed	Special Concern	
Insects				
Monarch (*Danaus plexippus*)	Endangered	Not Listed	Special Concern	
Mottled Duskywing (*Erynnis martialis*)	Endangered	Not Listed	Not Listed	
Plants				
Gattinger's Agalinis (*Agalinis gattingeri*)	Endangered	Endangered	Endangered	
Rough Agalinis (*Agalinis aspera*)	Endangered	Endangered	Endangered	
Western Silvery Aster (*Symphyotrichum sericeum*)	Threatened	Threatened	Threatened	
Ironweed (*Vernonia fasciculate*)	Endangered	Endangered	Endangered	

6.1.2 Assessment and Measurement Endpoints

Assessment endpoints are explicit expressions of the environmental values that are to be protected (FCSAP 2012). Assessment endpoints should include the VC and the attribute of the VC that is to be protected (e.g., abundance, viability of the population) (FCSAP 2012). The assessment endpoints to be evaluated during the closure phase in this EcoRA are presented in Table 6-3. As indicated in Section 4.1.3, during closure only atmospheric releases are expected to occur. Since atmospheric deposition to the Winnipeg River is considered negligible, consistent with the COG DRL guidance (COG, 2013), aquatic pathways and VCs are not considered during closure.

Measurement endpoints are conceptually related to assessment endpoints and are defined as the specific measures that will be used to judge the potential for effect on the attribute of an assessment endpoint (e.g., if we predict an effect on organism growth or reproduction, we can infer a potential for effect on abundance). Measurement endpoints are the foundation for the lines of evidence that are used to estimate risks to VCs (FCSAP 2012).

In this EcoRA, the assessment endpoints for most VCs are at the population or community level. For Species at Risk the assessment endpoint is at the individual level. While exposure and risk estimates always pertain to individuals, for most VCs, when effects on individuals are predicted from contaminant levels in a certain location, further discussion of population or community effects (or lack thereof) is appropriate. For Species at Risk, it is considered that effects on even a few individuals represent an effect on the population.

Table 6-3: Assessment Endpoints, Measurement Endpoints, and Lines of Evidence during Closure

Valued Components	Level of Protection	Protection Goal	Assessment Endpoint	Lines of Evidence	
				Line of Evidence	Use of Measurement Endpoints for Specific LOEs
Terrestrial Invertebrates (Earthworm)	Population	Maintenance of terrestrial invertebrate population at the WL site as a source of food for wildlife.	Viability of terrestrial invertebrate populations	Radiological and Toxicological Doses	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Terrestrial Birds (American Robin, Loggerhead Shrike*)	Population	Maintenance of the terrestrial bird population at the WL site.	Viability of terrestrial bird populations	Radiological and Toxicological Doses	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Terrestrial Plants (Grasses, shrubs, berries)	Population	Maintenance of the terrestrial plant population at the WL site.	Viability of terrestrial plant populations		
Terrestrial Mammals (Meadow Vole, Common Shrew, Snowshoe Hare, White-Tailed Deer, Red Fox, Little Brown Myotis*)	Population	Maintenance of terrestrial mammal population at the DN site.	Viability of terrestrial mammal populations		

Notes:
LOE: Line of evidence
* For species at risk, protection is at the individual level, recognizing that effects on even a few individuals represent an effect on the population.

6.1.3 Selection of Chemical, Radiological, and Other Stressors

For the closure phase, the relevant chemical and radiological contaminants will be released via atmospheric releases from WR-1 Complex during grouting and demolition. It has been assumed that the WR-1 Complex stack is removed during the closure phase; therefore, atmospheric releases are assumed to occur at ground level.

The radionuclides released to the atmospheric environment during closure are presented in Section 4.1.2.1 and apply as well for the EcoRA during closure.

No non-radiological COPCs were carried forward for the EcoRA during closure, because modelled on-site concentrations in air were well below air quality criteria, as described in Section 4.1.2.

6.1.4 Selection of Exposure Pathways

Exposure pathways include the routes of contaminant dispersion from the source to the receptor location, and the routes of contaminant transport through the food chain or other media to the receptor organism.

Airborne COPCs partition to soil and plants, and ingestion pathways dominate over inhalation and air immersion for most COPCs. The latter pathways are considered minor but inhalation has been included in the IMPACT™ model.

For soil invertebrates and terrestrial plants, the main exposure pathway is through contact with soil and contaminant uptake from soil via bioaccumulation. The dominant exposure pathways for birds and mammals are through the uptake of contaminants via the incidental ingestion of soil and ingestion of food.

6.1.5 Ecological Conceptual Model

The conceptual model illustrates how receptors are exposed to COPCs. It identifies the source of contaminants, receptor locations and the exposure pathways to be considered in the assessment for each receptor. Exposure pathways represent the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or (for radionuclides) how they may exert effects from outside the body. Table 6-4 summarizes the relevant exposure pathways for each type of ecological receptor. Although inhalation pathways are considered minor for ecological receptors, they have been included in the IMPACT™ model. The conceptual model for the EcoRA is illustrated in Figure 6-1.

Table 6-4: Complete Exposure Pathways for Selected VC Species during Closure

VC Category	VC	Exposure Pathways	Environmental Media
Terrestrial Invertebrates	Earthworm	Direct Contact	In Soil
Terrestrial Plants	Grasses/Shrubs	Direct Contact	On Soil
	Berries	Direct Contact	On Soil
Terrestrial Birds	American Robin	Direct Contact	On Soil
		Ingestion	Soil Earthworms Fruit/Berries
	Loggerhead Shrike	Direct Contact	On Soil
		Ingestion	Soil Earthworms American Robin Meadow Vole
Terrestrial Mammals	Meadow Vole	Direct Contact	On Soil
		Ingestion	Soil Grasses Fruit/Berries
	Common Shrew	Direct Contact	On Soil
		Ingestion	Soil Earthworms
	Snowshoe Hare	Direct Contact	On Soil
		Ingestion	Soil Grasses Fruit/Berries Shrubs
	White-tailed Deer	Direct Contact	On Soil
		Ingestion	Soil Grasses Fruit/Berries
	Red Fox	Direct Contact	In and on Soil
		Ingestion	Soil Grasses Fruit/Berries American Robin Loggerhead Shrike Meadow Vole Snowshoe Hare
	Little Brown Myotis	Direct Contact	On Soil
		Ingestion	Soil Earthworm

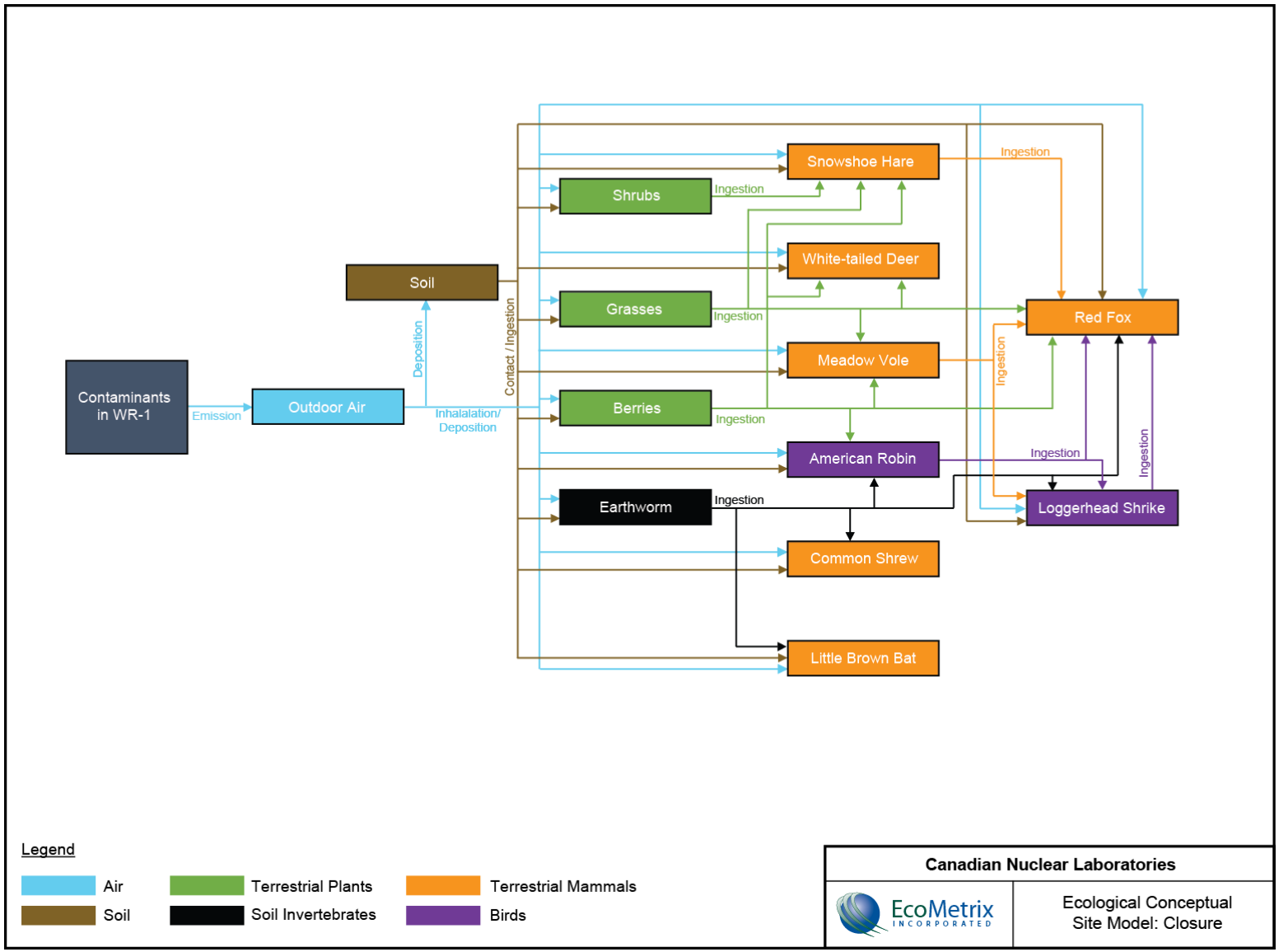

Figure 6-1: Ecological Conceptual Model for the Closure Phase

6.1.6 Uncertainty in Problem Formulation

The EcoRA problem formulation is conservative in its assumptions to accommodate uncertainties and meet the objective of protecting ecological health during the closure phase. The ecological conceptual model is considered to be complete for the majority of ecological exposures in the vicinity of the WL site. The comprehensive selection of COPCs and receptors is expected to represent all important exposures to contaminants in the vicinity of the WL site.

There are uncertainties in the predicted radiological and non-radiological release rates to the atmosphere; however, the estimates are expected to be appropriate as they are based on best available information on existing inventory of radiological and non-radiological contaminants in WR-1, as discussed in Section 3.1. Conservative assumptions were made about duration of release and particulate release rates.

6.2 Exposure Assessment

6.2.1 Exposure Points

Exposure point concentrations were derived from estimated release rates by modelling of atmospheric dispersion and deposition in IMPACT™ 5.5.1, as described in Section 3.2.5.

Ecological receptors such as terrestrial plants, earthworms, terrestrial birds and mammals in the closure phase were assumed to be located on the WL site near the atmospheric source, and to be exposed directly and indirectly to radiological and non-radiological contaminants as shown in the conceptual model in Figure 6-1.

6.2.2 Exposure Averaging

Birds and mammals are likely to experience something close to average concentrations as they move around their home range area. For less mobile organisms such as plants and invertebrates, both site average and upper limit concentrations represent exposures that would be experienced by some organisms on a long term basis.

For this assessment, birds and mammals were considered to spend all of their time at the exposure location. This is conservative for mobile birds and mammals on-site as they are likely to spend time offsite at lower exposure concentrations. No adjustment for home range has been included.

6.2.3 Exposure and Dose Calculations

6.2.3.1 Radiological Dose Calculations

Radiological dose calculations were estimated using the EcoMetrix Incorporated software IMPACT™ DRL Version 5.5.1 (IMPACT™). IMPACT™ is aligned with the COPC transport equations outlined in CSA N288.1 (2014) and with the methods of biota dose calculation

outlined in CSA N288.6 (2012). IMPACT™ uses specific activity models for tritium and C-14 as per CSA N288.1 (2014) and as recommended by CSA N288.6 (2012).

The radiation doses for the aquatic biota were estimated using the methods outlined in CSA N288.6 (2012). The dose for each radionuclide is comprised of an internal dose component, and an external dose component, which is driven by water and sediment. The 0.5 in the equation is for semi-infinite exposure to activity in water, for the time the organism spends at water surface, and for semi-infinite exposure to activity in sediment, for the time the organism spends at sediment surface. The aquatic biota dose was calculated using the following equations:

$$D_{int} = DC_{int} \cdot C_t$$

$$D_{ext} = DC_{ext} \cdot [(OF_w + 0.5 \cdot OF_{ws} + 0.5 \cdot OF_{ss}) \cdot C_w + (OF_s + 0.5 \cdot OF_{ss}) \cdot C_s]$$

where,

D_{int} = internal radiation dose (µGy/d)
D_{ext} = external radiation dose (µGy/d)
DC_{int} = internal dose conversion factor ((µGy/d)/(Bq/kg))
DC_{ext} = external dose coefficient ((µGy/d)/(Bq/kg))
C_t = whole body tissue concentration (Bq/kg fw)
C_w = water concentration (Bq/L)
C_s = sediment concentration (Bq/kg fw)
OF_w = occupancy factor in water (unitless)
OF_{ws} = occupancy factor at water surface (unitless)
OF_{ss} = occupancy factor at sediment surface (unitless)
OF_s = occupancy factor in sediment (unitless)

The radiation dose to terrestrial biota is estimated using a method similar to that for aquatic biota, except the external dose component is driven by soil rather than water and sediment. The terrestrial biota dose was calculated using the following equations:

$$D_{int} = DC_{int} \cdot C_t$$

$$D_{ext} = DC_{ext,s} \cdot OF_s \cdot C_s + DC_{ext,ss} \cdot OF_{ss} \cdot C_s$$

where,

DC_{int} = internal dose coefficient ((µGy/d)/(Bq/kg))
$DC_{ext,s}$ = external dose coefficient (in soil) ((µGy/d)/(Bq/kg))
$DC_{ext,ss}$ = external dose coefficient (on soil surface) (µGy/d)/(Bq/kg))
C_t = whole body tissue concentration (Bq/kg fw)
C_s = soil concentration (Bq/kg dw)
OF_s = occupancy factor in soil (unitless)
OF_{ss} = occupancy factor at soil surface (unitless)

The soil model in CSA N288.1-14 is a dynamic model that incorporates the input of activity due to wet and dry deposition from air and loss due to decay, erosion, leaching volatilization, and cropping (CSA 2014). Deposition from air to soil occurs over the modelling timeframe (6 months for demolition prior to grouting, and 1 year for grouting) and buildup of radionuclides in soil occurs over this time period.

The total radiation dose to biota is the sum of the internal and external dose components for each radionuclide ($D_{int} + D_{ext}$). External exposures through the air immersion and inhalation pathway are considered to be minor compared to the ingestion pathway. While air pathways are important for noble gases, the COPCs released to air from closure activities do not include noble gases.

6.2.3.2 Non-Radiological Dose Calculations

The non-radiological dose (D_{ing}) for mammals and birds was estimated using the methods described in CSA (2012), as follows:

$$D_{ing} = \Sigma\ C_x \cdot I_x / W$$

where,

C_x = concentration in the ingested item (x) (mg/kg)
I_x = ingestion rate of item x (kg/day)
W = body weight of consumer (kg fw)

For receptors that drink from contaminated water, the drinking water component was considered. The concentrations in the water and the ingestion rate were in units of volume. In addition, for receptors that have incidental contaminated soil or sediment ingestion, this pathway was considered on a dry weight basis. Other ingested items (foods) were considered on a fresh weight basis. As with the radiological dose calculations, inhalation exposure is considered minor compared to the ingestion exposure, and was ignored (CSA 2012).

6.2.3.3 Tissue Concentration Calculations

Tissue concentrations (C_t) in plants, fruits, invertebrates or fish, were calculated from concentrations in physical media (soil or water), using bioaccumulation factors (BAFs). These BAFs are also called concentration ratios (tissue to physical medium). While expressed relative to soil or water, BAFs encompass uptake into the organism from all relevant media, because these various routes of uptake are operative in the field studies from which BAFs are calculated. C_t was calculated as per CSA (2012), as follows:

$$C_t = C_m \cdot BAF$$

where,

C_t = whole body tissue concentration (Bq/kg fw)

C_m = media concentration (Bq/L or Bq/kg)
BAF = bioaccumulation factor (L/kg or kg/kg)

For birds and mammals, tissue concentrations were estimated using transfer factors (TFs), or biomagnification factors (BMFs) and the concentrations in their food, as follows:

$$C_t = \Sigma\, C_x \cdot I_x \cdot TF = C_f \cdot BMF$$

where,

C_x = concentration in the ingested item x (Bq/kg fw)
I_x = ingestion rate of item x (kg fw/d)
TF = ingestion transfer factor (d/kg)
C_f = average concentration in food (Bq/kg fw)
BMF = biomagnification factor (unitless)

The BMF is equivalent to the total food intake rate times the transfer factor:

$$BMF = \Sigma\, I_x \cdot TF$$

The BAFs, TFs and ingestion rates used for the calculation of tissue concentrations in biota are further described in Section 6.2.4.

6.2.4 Exposure Factors

There are several COPC- and biota-specific exposure factors required for the dose calculations. These parameters include intake rates, body weights, occupancy factors, BAFs, TFs, and dose coefficients (DCs).

The body weight and intake rates are required for the calculation of exposure to birds and mammals, and are presented in Table 6-5.

Biota are assumed to reside in the WL site 100% of the time. An occupancy factor is defined as the fraction of time the receptor species spends in or on various media. The occupancy factors are based on the experience and judgement of the risk assessor and the known behaviour of the receptor.

Bioaccumulation factors (BAFs) relate the COPCs in the environmental media to the concentration in the receptor. BAFs were used to calculate COPC concentrations in plant, invertebrate and fish tissues. These factors vary throughout the literature, but were generally obtained from CSA (2014) and IAEA (2010).

Transfer factors represent the fraction of daily COPC intake transferred to the tissue of birds and mammals. Ingestion transfer factors are COPC and biota-specific. Transfer factors from feed to tissue for agricultural livestock are available in CSA (2014). An allometric equation (transfer proportional to a -3/4 power of body weight) (CSA 2012), was

applied to transfer factors available for beef, rabbit and poultry, to estimate the transfer factors for the bird and mammal receptors.

Radiation dose coefficients (DCs) are used for terrestrial and aquatic biota to calculate the radiation dose. These DCs were taken from ICRP (2008) and the ERICA Tool (2016). Surrogate species from these sources were selected to represent the VCs, considering similarities in body size and likely external exposure media. The DC values in ICRP (2008) do not incorporate radiation quality factors for relative biological effectiveness (RBE) for low beta and alpha components. Therefore, the “low beta” components of the DCs were multiplied by 2, and the alpha components were multiplied by 10 (as per CSA N288.6-12) in order to represent its greater relative effectiveness. The ERICA Tool uses a “low beta” RBE of 3. This is conservative as CSA N288.6-12 recommends a value of 2.

The DCs include contributions from both parent and daughter nuclides (if any) for daughters with half-lives of less than 10 days. Both ICRP (2008) and ERICA Tool (2016) assume that the parent and daughter are in secular equilibrium. For daughter nuclides with half-lives greater than 10 days that will be in or near equilibrium with the parent over a relevant timeframe for ingrowth, secular equilibrium has been assumed and the daughter DCs have been added to the parent DCs. For external soil exposure, a relevant timeframe of 40 years was assumed, consistent with CSA N288.1-14.

The exposure factors used in this assessment are presented in Appendix B.

Table 6-5: Bird and Mammal Body Weights and Intake Rates for the Closure Phase

Receptor	Body weight	Total Feed Intake[a]		Dietary Components	Feed Type Fraction	Feed Intake		Moisture[d]	Dry weight Fraction	Intake of Soil/ Sediment[e]	Basis of the Soil and Sediment Intake Value	Total Soil/ Sediment[f]	Water Intake	Inhalation[g]
	kg	kg/d dw	kg/d fw			kg/d dw[b]	kg/d fw[c]	%		%		kg DW/d	L/d	m^3/d
Birds														
American Robin	0.079	0.012	0.096	Fruit (Berries)	0.6	0.006	0.057	90	0.10	4.0	American Woodcock	4.89E-04	0.011	0.058
				Soil Invertebrates (Earthworms)	0.4	0.007	0.038	83[h]	0.17					
Loggerhead Shrike	0.0425[i]	0.0096[g]	0.049	Soil Invertebrates (Earthworms)[j]	0.8	0.007	0.039	83[h]	0.17	2.0	Default Rate	1.93E-04	0.007[g]	0.036
				Terrestrial Birds (Robin)[k]	0.1	0.001	0.005	70	0.30					
				Small mammals (Meadow Vole)[j]	0.1	0.001	0.005	70	0.30					
Mammals														
Meadow Vole	0.0349	0.0015	0.011	Terrestrial Vegetation (Grass)	0.3	0.0007	0.003	80	0.20	2.4	Meadow Vole	3.54E-05	0.007	0.037
				Fruit (Berries)	0.7	0.0008	0.008	90	0.10					
Common (Masked) Shrew	0.0041	0.001	0.008	Soil Invertebrates (Earthworms)	1	0.001	0.008	83[h]	0.17	2.0	Default Rate	2.75E-05	0.0007	0.0067
Red Fox	3.8	0.084	0.342	Small Mammals (Meadow Vole)	0.2	0.021	0.068	70	0.30	2.8	Red Fox	2.35E-03	0.34	1.59
				Small Mammals (Rabbit)	0.2	0.021	0.068	70	0.30					
				Soil Invertebrates (Earthworm)	0.25	0.015	0.086	83[h]	0.17					
				Terrestrial Birds (Robin)[l]	0.1	0.010	0.034	70	0.30					
				Terrestrial Birds (Shrike)[j]	0.1	0.010	0.034	70	0.30					
				Fruits (Berries)	0.075	0.003	0.026	90	0.10					
				Terrestrial Vegetation (Grass)	0.075	0.005	0.026	80	0.20					
Little Brown Myotis[m]	0.0075	0.0006	0.0037	Soil Invertebrate (Closure)	1	0.0006	0.0037	83[h]	0.17	0	Assumed negligible (aerial)	0	0.0012	0.011
White-tailed Deer[d]	80	2.5	13.89	Terrestrial Vegetation (Grass)[n]	0.8	2.22	11.1	80	0.20	1.0	CSA 2014 (Sheppard 1995)	3.50E-02	5.7	18
				Fruits (Berries)[n]	0.2	0.278	2.78	90	0.10					
Snowshoe Hare (Rabbit)[d]	1.8	0.110	0.58	Terrestrial Vegetation (Grass)[n]	0.3	0.035	0.174	80	0.20	10	CSA 2014	1.70E-02	0.36	0.9
				Fruits (Berries)[n]	0.1	0.006	0.058	90	0.10					
				Shrubs (Forage)[n]	0.6	0.070	0.347	80	0.20					

Notes:
FCSAP 2012 unless otherwise stated
[a] Total feed intake on a dry weight basis was estimated from the total feed intake on a fresh weight basis using the approach in Sample *et al*. 1997, and vice versa using a total wet feed to dry feed.
[b] Calculated by multiplying the Feed Type Fraction by the Total Feed Intake on fresh weight and by the Dry Weight Fraction.
[c] Calculated by multiplying the Feed Type Fraction by the Total Feed Intake on a fresh weight
[d] CSA 2014
[e] Beyer *et al*. 1994
[f] Calculated by multiplying the Total Feed Type by the fraction of the Intake of Soil/Sediment
[g] U.S. EPA (1993)
[h] Beresford *et al*. 2008
[i] Cornell Lab of Ornithology
[j] National Wildlife Federation 2000
[k] Rita Welch 2016
[l] NatureServe Explorer 2015
[m] Sample and Suter 1994
[n] Dietary fraction from FSCAP (2012)
[*] Fraction of diet was assumed

6.2.5 Dispersion Models

As discussed in Section 4.2.5, the Gaussian plume model in IMPACT™ was used to model atmospheric releases during the closure phase to estimate air concentrations of COPCs at receptor locations. IMPACT™ also calculated the subsequent deposition of COPCs at each location, and their transfer to other environmental media and receptors.

The soil type in the model was represented by clay with a dry bulk density of 1400 kg-dw/m^3, consistent with N288.1-14, the WL DRL Report (CNL 2016b), and the geosynthesis describing local soil composition (CNL 2021a)

6.2.6 Exposure Point Concentrations and Doses

The radiological dose to all ecological receptors identified are presented for the closure phase at the end of the demolition prior to grouting and grouting periods for both maximum and average atmospheric release scenarios. Sample calculations are presented in Appendix C.

Table 6-6: Estimated Radiation Dose for Ecological Receptors during Demolition Prior to Grouting – Maximum

Radionuclide	Unit	American Robin	Loggerhead Shrike	Meadow Vole	Common Shrew	Deer	Rabbit	Red Fox	Little Brown Bat	Forage	Grass	Fruits	Earthworm
Ag-108m	mGy/d	3.64E-11	4.38E-11	1.46E-11	2.31E-11	1.90E-11	1.50E-11	1.50E-11	9.52E-12	3.70E-11	4.37E-11	9.94E-11	5.03E-11
Am-241	mGy/d	1.39E-08	1.47E-08	6.50E-07	3.24E-07	5.87E-07	4.21E-07	4.33E-07	2.58E-07	2.38E-04	2.38E-04	6.79E-07	3.24E-06
Am-243	mGy/d	2.34E-11	2.41E-11	5.77E-10	2.94E-10	5.16E-10	3.78E-10	3.90E-10	2.30E-10	2.07E-07	2.07E-07	5.96E-10	2.84E-09
C-14	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ca-41	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl-36	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cm-244	mGy/d	6.62E-11	7.25E-11	2.54E-10	1.29E-10	3.69E-09	2.61E-09	1.69E-10	1.02E-10	2.47E-06	2.47E-06	6.99E-09	3.68E-08
Co-60	mGy/d	7.49E-09	7.88E-09	6.74E-09	6.76E-09	1.22E-08	8.01E-09	6.12E-09	3.37E-09	1.41E-08	2.17E-08	4.14E-09	4.57E-09
Cs-137	mGy/d	5.17E-05	7.73E-05	8.17E-06	4.24E-05	1.02E-04	1.70E-03	1.27E-04	1.30E-05	2.82E-05	3.21E-05	1.69E-05	2.62E-05
Eu-152	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eu-154	mGy/d	5.18E-08	5.18E-08	5.80E-08	5.94E-08	1.76E-07	9.38E-08	5.19E-08	2.95E-08	2.97E-07	3.63E-07	4.08E-08	5.39E-08
Eu-155	mGy/d	2.78E-08	2.78E-08	3.88E-10	4.20E-10	2.07E-09	1.19E-09	3.24E-10	2.06E-10	6.91E-09	7.50E-09	4.37E-10	7.33E-10
Fe-55	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTO	mGy/d	1.62E-07	1.49E-07	1.22E-07	1.22E-07	1.39E-07	1.22E-07	9.08E-08	1.22E-07	2.76E-07	2.76E-07	3.10E-07	2.86E-07
I-129	mGy/d	1.11E-12	1.11E-12	5.79E-13	8.81E-13	7.20E-12	4.33E-12	3.60E-13	2.80E-13	1.75E-11	1.83E-11	7.28E-13	1.73E-12
Nb-94	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-59	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Np-237	mGy/d	2.99E-12	3.52E-12	2.40E-11	3.35E-11	7.22E-11	5.12E-11	1.65E-11	1.54E-11	1.08E-08	1.08E-08	3.05E-10	1.11E-09
Np-239	mGy/d	3.45E-13	3.53E-13	1.10E-12	1.13E-12	1.76E-12	9.37E-13	1.27E-12	9.16E-13	1.52E-10	1.52E-10	4.36E-12	1.56E-11
OBT	mGy/d	7.91E-09	6.63E-09	5.85E-09	5.85E-09	6.60E-09	5.85E-09	3.01E-09	5.85E-09	2.70E-12	2.70E-12	1.35E-08	2.87E-08
Pu-238	mGy/d	7.89E-10	8.29E-10	1.74E-10	8.46E-11	7.53E-08	5.23E-08	1.17E-10	6.83E-11	2.82E-05	2.82E-05	8.00E-08	3.12E-07
Pu-239	mGy/d	1.79E-09	1.88E-09	3.92E-10	1.87E-10	1.72E-07	1.19E-07	2.62E-10	1.53E-10	6.44E-05	6.44E-05	1.82E-07	7.11E-07
Pu-240	mGy/d	2.60E-09	2.73E-09	5.75E-10	2.79E-10	2.48E-07	1.72E-07	3.86E-10	2.25E-10	9.31E-05	9.31E-05	2.64E-07	1.03E-06
Pu-241	mGy/d	1.05E-11	1.08E-11	5.11E-12	4.28E-12	6.93E-10	4.83E-10	4.13E-12	2.38E-12	2.59E-07	2.59E-07	7.35E-10	2.86E-09
Sr-90	mGy/d	7.77E-07	9.79E-07	6.97E-07	5.45E-06	3.39E-05	6.96E-06	4.94E-07	1.58E-06	5.56E-05	5.56E-05	2.11E-05	5.99E-05
Tc-99	mGy/d	6.28E-10	8.11E-10	2.03E-11	1.59E-10	1.06E-10	7.05E-11	1.57E-11	4.60E-11	2.73E-09	2.73E-09	7.81E-10	2.72E-09
U-235	mGy/d	2.25E-10	2.98E-10	8.89E-12	1.37E-11	3.93E-08	1.08E-10	4.34E-12	4.28E-12	5.24E-09	5.24E-09	1.51E-10	5.25E-10
U-238	mGy/d	4.57E-09	6.06E-09	1.59E-10	2.56E-10	7.93E-07	2.19E-09	6.83E-11	7.59E-11	1.07E-07	1.07E-07	3.03E-09	1.07E-08
Total	**mGy/d**	**5.27E-05**	**7.86E-05**	**9.71E-06**	**4.84E-05**	**1.38E-04**	**1.70E-03**	**1.28E-04**	**1.50E-05**	**5.11E-04**	**5.15E-04**	**3.95E-05**	**9.18E-05**

Table 6-7: Estimated Radiation Dose for Ecological Receptors during Demolition Prior to Grouting – Average

Radionuclide	Unit	American Robin	Loggerhead Shrike	Meadow Vole	Common Shrew	Deer	Rabbit	Red Fox	Little Brown Bat	Forage	Grass	Fruits	Earthworm
Ag-108m	mGy/d	9.57E-12	1.15E-11	3.84E-12	6.08E-12	4.99E-12	3.95E-12	3.95E-12	2.50E-12	9.72E-12	1.15E-11	2.61E-11	1.32E-11
Am-241	mGy/d	3.65E-09	3.86E-09	1.71E-07	8.51E-08	1.54E-07	1.11E-07	1.14E-07	6.78E-08	6.26E-05	6.26E-05	1.78E-07	8.52E-07
Am-243	mGy/d	6.16E-12	6.34E-12	1.52E-10	7.72E-11	1.36E-10	9.94E-11	1.02E-10	6.05E-11	5.44E-08	5.44E-08	1.57E-10	7.46E-10
C-14	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ca-41	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl-36	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cm-244	mGy/d	1.74E-11	1.91E-11	6.68E-11	3.40E-11	9.70E-10	6.86E-10	4.44E-11	2.68E-11	6.49E-07	6.49E-07	1.84E-09	9.67E-09
Co-60	mGy/d	1.97E-09	2.07E-09	1.77E-09	1.78E-09	3.20E-09	2.11E-09	1.61E-09	8.86E-10	3.70E-09	5.70E-09	1.09E-09	1.20E-09
Cs-137	mGy/d	1.36E-05	2.03E-05	2.15E-06	1.11E-05	2.67E-05	4.46E-04	3.34E-05	3.41E-06	7.41E-06	8.44E-06	4.43E-06	6.88E-06
Eu-152	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eu-154	mGy/d	1.36E-08	1.36E-08	1.52E-08	1.56E-08	4.63E-08	2.47E-08	1.36E-08	7.76E-09	7.81E-08	9.55E-08	1.07E-08	1.42E-08
Eu-155	mGy/d	7.31E-09	7.31E-09	1.02E-10	1.10E-10	5.45E-10	3.12E-10	8.52E-11	5.41E-11	1.82E-09	1.97E-09	1.15E-10	1.93E-10
Fe-55	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTO	mGy/d	4.90E-08	4.52E-08	3.72E-08	3.72E-08	4.23E-08	3.72E-08	2.76E-08	3.72E-08	8.37E-08	8.37E-08	9.42E-08	8.68E-08
I-129	mGy/d	2.91E-13	2.92E-13	1.52E-13	2.32E-13	1.89E-12	1.14E-12	9.46E-14	7.37E-14	4.60E-12	4.82E-12	1.91E-13	4.55E-13
Nb-94	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-59	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	mGy/d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Np-237	mGy/d	7.87E-13	9.26E-13	6.31E-12	8.82E-12	1.90E-11	1.35E-11	4.34E-12	4.04E-12	2.83E-09	2.83E-09	8.02E-11	2.93E-10
Np-239	mGy/d	9.07E-14	9.29E-14	2.89E-13	2.96E-13	4.62E-13	2.46E-13	3.33E-13	2.41E-13	4.00E-11	4.00E-11	1.15E-12	4.10E-12
OBT	mGy/d	2.40E-09	2.01E-09	1.77E-09	1.77E-09	2.00E-09	1.77E-09	9.14E-10	1.77E-09	8.20E-13	8.20E-13	4.10E-09	8.71E-09
Pu-238	mGy/d	2.07E-10	2.18E-10	4.59E-11	2.22E-11	1.98E-08	1.37E-08	3.08E-11	1.80E-11	7.42E-06	7.42E-06	2.10E-08	8.20E-08
Pu-239	mGy/d	4.72E-10	4.95E-10	1.03E-10	4.93E-11	4.51E-08	3.13E-08	6.88E-11	4.02E-11	1.69E-05	1.69E-05	4.79E-08	1.87E-07
Pu-240	mGy/d	6.84E-10	7.19E-10	1.51E-10	7.33E-11	6.53E-08	4.53E-08	1.02E-10	5.92E-11	2.45E-05	2.45E-05	6.94E-08	2.70E-07
Pu-241	mGy/d	2.75E-12	2.84E-12	1.34E-12	1.13E-12	1.82E-10	1.27E-10	1.08E-12	6.26E-13	6.81E-08	6.81E-08	1.93E-10	7.52E-10
Sr-90	mGy/d	2.04E-07	2.57E-07	1.83E-07	1.43E-06	8.90E-06	1.83E-06	1.30E-07	4.16E-07	1.46E-05	1.46E-05	5.54E-06	1.57E-05
Tc-99	mGy/d	1.65E-10	2.13E-10	5.33E-12	4.17E-11	2.79E-11	1.85E-11	4.13E-12	1.21E-11	7.18E-10	7.18E-10	2.05E-10	7.15E-10
U-235	mGy/d	5.90E-11	7.82E-11	2.34E-12	3.59E-12	1.03E-08	2.85E-11	1.14E-12	1.12E-12	1.38E-09	1.38E-09	3.96E-11	1.38E-10
U-238	mGy/d	1.20E-09	1.59E-09	4.17E-11	6.74E-11	2.08E-07	5.76E-10	1.80E-11	1.99E-11	2.81E-08	2.81E-08	7.97E-10	2.82E-09
Total	**mGy/d**	**1.39E-05**	**2.07E-05**	**2.56E-06**	**1.27E-05**	**3.62E-05**	**4.48E-04**	**3.37E-05**	**3.95E-06**	**1.34E-04**	**1.35E-04**	**1.04E-05**	**2.41E-05**

Table 6-8: Estimated Radiation Dose for Ecological Receptors during Grouting – Maximum

Radionuclide	Unit	American Robin	Loggerhead Shrike	Meadow Vole	Common Shrew	Deer	Rabbit	Red Fox	Little Brown Bat	Forage	Grass	Fruits	Earthworm
Ag-108m	mGy/d	2.19E-13	2.54E-13	1.24E-13	1.63E-13	1.14E-13	1.26E-13	1.29E-13	7.20E-14	1.94E-13	2.54E-13	4.65E-13	3.05E-13
Am-241	mGy/d	1.59E-11	1.69E-11	5.41E-10	2.94E-10	4.86E-10	3.52E-10	3.63E-10	2.21E-10	1.97E-07	1.97E-07	5.63E-10	3.38E-09
Am-243	mGy/d	3.24E-14	3.32E-14	4.88E-13	2.74E-13	4.30E-13	3.24E-13	3.35E-13	2.01E-13	1.70E-10	1.70E-10	4.95E-13	2.96E-12
C-14	mGy/d	5.28E-09	5.28E-09	4.35E-09	4.35E-09	4.35E-09	4.35E-09	4.35E-09	4.35E-09	2.16E-09	2.16E-09	1.08E-09	2.40E-09
Ca-41	mGy/d	8.85E-16	1.11E-15	7.96E-16	6.18E-15	3.63E-14	7.94E-15	5.66E-16	1.79E-15	7.85E-14	7.85E-14	2.27E-14	7.77E-14
Cl-36	mGy/d	3.80E-15	4.12E-15	6.25E-16	2.79E-15	6.88E-15	4.35E-15	7.37E-16	8.10E-16	4.03E-15	4.03E-15	1.53E-15	2.63E-15
Cm-244	mGy/d	5.68E-14	6.48E-14	2.06E-13	1.16E-13	2.99E-12	2.12E-12	1.38E-13	8.57E-14	2.00E-09	2.00E-09	5.66E-12	3.94E-11
Co-60	mGy/d	7.58E-06	7.79E-06	7.34E-06	7.35E-06	8.68E-06	8.05E-06	6.66E-06	3.67E-06	1.19E-05	2.02E-05	3.55E-06	4.63E-06
Cs-137	mGy/d	4.46E-08	6.56E-08	9.23E-09	3.72E-08	8.41E-08	1.39E-06	1.08E-07	1.19E-08	2.61E-08	3.25E-08	1.46E-08	2.29E-08
Eu-152	mGy/d	1.72E-11	1.72E-11	1.86E-11	1.87E-11	3.03E-11	2.22E-11	1.68E-11	9.34E-12	4.16E-11	6.43E-11	9.56E-12	1.22E-11
Eu-154	mGy/d	8.13E-11	8.13E-11	8.80E-11	8.92E-11	1.63E-10	1.17E-10	7.93E-11	4.44E-11	2.89E-10	3.93E-10	4.78E-11	6.69E-11
Eu-155	mGy/d	4.27E-11	4.27E-11	5.29E-13	5.55E-13	1.74E-12	1.17E-12	4.48E-13	2.74E-13	5.93E-12	6.84E-12	4.48E-13	6.53E-13
Fe-55	mGy/d	1.65E-09	2.41E-09	1.10E-09	1.77E-09	5.73E-09	4.05E-09	7.08E-10	5.17E-10	2.02E-08	2.02E-08	5.90E-10	2.05E-09
HTO	mGy/d	5.65E-07	5.21E-07	4.28E-07	4.28E-07	4.87E-07	4.28E-07	3.18E-07	4.28E-07	9.65E-07	9.65E-07	1.09E-06	1.00E-06
I-129	mGy/d	1.75E-15	1.75E-15	5.65E-16	8.26E-16	5.94E-15	3.64E-15	3.71E-16	2.79E-16	1.50E-14	1.63E-14	6.77E-16	1.46E-15
Nb-94	mGy/d	1.07E-07	1.07E-07	1.07E-07	1.07E-07	5.62E-08	1.07E-07	9.72E-08	5.33E-08	2.43E-07	3.72E-07	5.62E-08	7.48E-08
Ni-59	mGy/d	2.05E-09	2.64E-09	4.55E-10	3.57E-09	3.27E-09	2.15E-09	3.80E-10	1.04E-09	1.12E-08	1.12E-08	3.35E-09	1.12E-08
Ni-63	mGy/d	2.36E-07	3.05E-07	1.31E-07	1.03E-06	9.42E-07	6.20E-07	1.09E-07	2.99E-07	3.39E-06	3.39E-06	9.66E-07	3.38E-06
Np-237	mGy/d	2.72E-15	3.19E-15	2.00E-14	2.85E-14	5.93E-14	4.23E-14	1.38E-14	1.30E-14	8.83E-12	8.84E-12	2.51E-13	9.45E-13
Np-239	mGy/d	2.83E-16	2.90E-16	9.04E-16	9.25E-16	1.44E-15	7.69E-16	1.04E-15	7.52E-16	1.25E-13	1.25E-13	3.58E-15	1.28E-14
OBT	mGy/d	2.77E-08	2.32E-08	2.04E-08	2.04E-08	2.31E-08	2.04E-08	1.05E-08	2.04E-08	9.46E-12	9.46E-12	4.73E-08	1.00E-07
Pu-238	mGy/d	6.62E-13	7.01E-13	1.48E-13	7.62E-14	6.16E-11	4.28E-11	1.01E-13	5.90E-14	2.31E-08	2.31E-08	6.55E-11	2.79E-10
Pu-239	mGy/d	1.51E-12	1.60E-12	3.30E-13	1.65E-13	1.41E-10	9.79E-11	2.22E-13	1.30E-13	5.28E-08	5.28E-08	1.50E-10	6.38E-10
Pu-240	mGy/d	2.19E-12	2.32E-12	4.89E-13	2.52E-13	2.04E-10	1.42E-10	3.34E-13	1.95E-13	7.64E-08	7.64E-08	2.17E-10	9.24E-10
Pu-241	mGy/d	1.11E-14	1.15E-14	6.94E-15	6.28E-15	5.62E-13	3.94E-13	5.78E-15	3.33E-15	2.10E-10	2.10E-10	5.97E-13	2.53E-12
Sr-90	mGy/d	6.36E-10	7.98E-10	5.72E-10	4.44E-09	2.78E-08	5.71E-09	4.03E-10	1.29E-09	4.55E-08	4.55E-08	1.73E-08	4.88E-08
Tc-99	mGy/d	5.16E-13	6.66E-13	1.67E-14	1.30E-13	8.73E-14	5.80E-14	1.29E-14	3.78E-14	2.25E-12	2.25E-12	6.42E-13	2.23E-12
U-235	mGy/d	1.86E-13	2.46E-13	8.22E-15	1.22E-14	3.22E-11	8.99E-14	4.38E-15	3.98E-15	4.30E-12	4.31E-12	1.24E-13	4.32E-13
U-238	mGy/d	3.77E-12	5.00E-12	1.30E-13	2.11E-13	6.51E-10	1.80E-12	5.63E-14	6.25E-14	8.77E-11	8.77E-11	2.49E-12	8.83E-12
Total	**mGy/d**	**8.57E-06**	**8.83E-06**	**8.04E-06**	**8.98E-06**	**1.03E-05**	**1.06E-05**	**7.31E-06**	**4.49E-06**	**1.70E-05**	**2.54E-05**	**5.74E-06**	**9.29E-06**

Table 6-9: Estimated Radiation Dose for Ecological Receptors during Grouting – Average

Radionuclide	Unit	American Robin	Loggerhead Shrike	Meadow Vole	Common Shrew	Deer	Rabbit	Red Fox	Little Brown Bat	Forage	Grass	Fruits	Earthworm
Ag-108m	mGy/d	1.16E-13	1.34E-13	6.56E-14	8.61E-14	6.03E-14	6.66E-14	6.82E-14	3.82E-14	1.03E-13	1.34E-13	2.46E-13	1.62E-13
Am-241	mGy/d	8.45E-12	8.95E-12	2.87E-10	1.56E-10	2.58E-10	1.87E-10	1.92E-10	1.17E-10	1.04E-07	1.04E-07	2.99E-10	1.79E-09
Am-243	mGy/d	1.72E-14	1.76E-14	2.58E-13	1.45E-13	2.28E-13	1.72E-13	1.78E-13	1.07E-13	9.01E-11	9.01E-11	2.63E-13	1.57E-12
C-14	mGy/d	2.80E-09	2.80E-09	2.30E-09	2.30E-09	2.30E-09	2.30E-09	2.30E-09	2.30E-09	1.15E-09	1.15E-09	5.73E-10	1.27E-09
Ca-41	mGy/d	4.69E-16	5.88E-16	4.22E-16	3.27E-15	1.92E-14	4.21E-15	3.00E-16	9.50E-16	4.16E-14	4.16E-14	1.20E-14	4.12E-14
Cl-36	mGy/d	2.01E-15	2.18E-15	3.31E-16	1.48E-15	3.65E-15	2.30E-15	3.91E-16	4.29E-16	2.14E-15	2.14E-15	8.11E-16	1.39E-15
Cm-244	mGy/d	3.01E-14	3.44E-14	1.09E-13	6.16E-14	1.58E-12	1.12E-12	7.30E-14	4.54E-14	1.06E-09	1.06E-09	3.00E-12	2.09E-11
Co-60	mGy/d	4.01E-06	4.13E-06	3.89E-06	3.89E-06	4.60E-06	4.27E-06	3.53E-06	1.94E-06	6.33E-06	1.07E-05	1.88E-06	2.46E-06
Cs-137	mGy/d	2.36E-08	3.48E-08	4.89E-09	1.97E-08	4.46E-08	7.34E-07	5.74E-08	6.30E-09	1.38E-08	1.72E-08	7.75E-09	1.21E-08
Eu-152	mGy/d	9.09E-12	9.09E-12	9.85E-12	9.92E-12	1.60E-11	1.18E-11	8.88E-12	4.95E-12	2.20E-11	3.41E-11	5.07E-12	6.47E-12
Eu-154	mGy/d	4.31E-11	4.31E-11	4.66E-11	4.73E-11	8.62E-11	6.19E-11	4.20E-11	2.35E-11	1.53E-10	2.08E-10	2.53E-11	3.55E-11
Eu-155	mGy/d	2.26E-11	2.26E-11	2.81E-13	2.94E-13	9.21E-13	6.18E-13	2.37E-13	1.45E-13	3.14E-12	3.62E-12	2.37E-13	3.46E-13
Fe-55	mGy/d	8.72E-10	1.28E-09	5.80E-10	9.40E-10	3.04E-09	2.14E-09	3.75E-10	2.74E-10	1.07E-08	1.07E-08	3.12E-10	1.09E-09
HTO	mGy/d	5.65E-07	5.21E-07	4.28E-07	4.28E-07	4.87E-07	4.28E-07	3.18E-07	4.28E-07	9.65E-07	9.65E-07	1.09E-06	1.00E-06
I-129	mGy/d	9.28E-16	9.29E-16	2.99E-16	4.38E-16	3.15E-15	1.93E-15	1.97E-16	1.48E-16	7.95E-15	8.62E-15	3.59E-16	7.76E-16
Nb-94	mGy/d	5.64E-08	5.64E-08	5.64E-08	5.64E-08	2.98E-08	5.66E-08	5.15E-08	2.82E-08	1.29E-07	1.97E-07	2.98E-08	3.96E-08
Ni-59	mGy/d	1.08E-09	1.40E-09	2.41E-10	1.89E-09	1.73E-09	1.14E-09	2.02E-10	5.49E-10	5.93E-09	5.95E-09	1.77E-09	5.92E-09
Ni-63	mGy/d	1.25E-07	1.62E-07	6.95E-08	5.45E-07	4.99E-07	3.28E-07	5.76E-08	1.58E-07	1.80E-06	1.80E-06	5.12E-07	1.79E-06
Np-237	mGy/d	1.44E-15	1.69E-15	1.06E-14	1.51E-14	3.14E-14	2.24E-14	7.32E-15	6.87E-15	4.68E-12	4.68E-12	1.33E-13	5.01E-13
Np-239	mGy/d	1.50E-16	1.54E-16	4.79E-16	4.90E-16	7.64E-16	4.07E-16	5.50E-16	3.98E-16	6.61E-14	6.62E-14	1.90E-15	6.79E-15
OBT	mGy/d	2.77E-08	2.32E-08	2.04E-08	2.04E-08	2.31E-08	2.04E-08	1.05E-08	2.04E-08	9.46E-12	9.46E-12	4.73E-08	1.00E-07
Pu-238	mGy/d	3.51E-13	3.72E-13	7.84E-14	4.04E-14	3.27E-11	2.27E-11	5.35E-14	3.12E-14	1.22E-08	1.22E-08	3.47E-11	1.48E-10
Pu-239	mGy/d	7.98E-13	8.46E-13	1.75E-13	8.77E-14	7.47E-11	5.19E-11	1.18E-13	6.91E-14	2.80E-08	2.80E-08	7.93E-11	3.38E-10
Pu-240	mGy/d	1.16E-12	1.23E-12	2.59E-13	1.33E-13	1.08E-10	7.50E-11	1.77E-13	1.03E-13	4.05E-08	4.05E-08	1.15E-10	4.89E-10
Pu-241	mGy/d	5.90E-15	6.09E-15	3.68E-15	3.33E-15	2.98E-13	2.09E-13	3.06E-15	1.77E-15	1.11E-10	1.11E-10	3.16E-13	1.34E-12
Sr-90	mGy/d	3.37E-10	4.23E-10	3.03E-10	2.35E-09	1.47E-08	3.02E-09	2.14E-10	6.83E-10	2.41E-08	2.41E-08	9.19E-09	2.58E-08
Tc-99	mGy/d	2.73E-13	3.53E-13	8.83E-15	6.90E-14	4.63E-14	3.07E-14	6.85E-15	2.00E-14	1.19E-12	1.19E-12	3.40E-13	1.18E-12
U-235	mGy/d	9.87E-14	1.31E-13	4.35E-15	6.46E-15	1.71E-11	4.76E-14	2.32E-15	2.11E-15	2.28E-12	2.28E-12	6.58E-14	2.29E-13
U-238	mGy/d	2.00E-12	2.65E-12	6.91E-14	1.12E-13	3.45E-10	9.53E-13	2.98E-14	3.31E-14	4.65E-11	4.65E-11	1.32E-12	4.68E-12
Total	**mGy/d**	**4.82E-06**	**4.93E-06**	**4.47E-06**	**4.97E-06**	**5.71E-06**	**5.84E-06**	**4.03E-06**	**2.59E-06**	**9.46E-06**	**1.39E-05**	**3.57E-06**	**5.44E-06**

6.2.7 Uncertainties in Exposure Assessment

Uncertainties in the exposure assessment include the representativeness of the predicted concentrations used in the assessment at each location. Maximum and mean predicted concentrations of COPCs were used for each location and environmental medium. Maximum concentrations were used as an upper bound on exposure. These values are, by definition, not representative for mobile organisms that can move around the site, effectively averaging their exposure concentrations. Maximum values are representative for exposures of any sessile organisms that reside at the location of the maximum value. Therefore, maximum concentrations are considered to overestimate exposure for all mobile receptors.

Exposure factors were based on best-available information from literature with preference for exposure factors identified in CSA N288.1-14 (2014). For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6. This is considered appropriate.

Since the exposure assessment is predictive, BAFs were used to calculate uptake into tissues. BAFs are not species specific, e.g., the same BAFs are used for berries as for grasses and shrubs. Additionally, the BAFs used for the exposure assessment were not site-specific; they were taken from reputable sources (e.g., N288.1-14) and are considered to be representative of the conditions found at the site.

Wildlife exposure factors, such as intake rates and diets, are a potential source of uncertainty. Reputable sources are used for these factors and they are considered to be representative for the organisms assessed.

Dose coefficients were obtained from reputable sources for reference organisms, but have not been derived specifically for all the organisms assessed. Dose coefficients for surrogate organisms were often used. They were selected with attention to similar body size and exposure habits, and are believed to adequately represent the organism assessed. Dose coefficients for each receptor were not adjusted for body size and dimensions.

The IMPACT^{TM} model was used to predict dose to identified ecological receptors during the closure phase. The IMPACT^{TM} model used is a steady state model; however, it includes time dependent equations to account for buildup in soil from irrigation, for all radionuclides released.

Uncertainties in predictions of media concentrations arise from inherent uncertainty in the air model in IMPACT^{TM}. The model reports an average concentration, and typically over-predicts this concentration by a factor of 1.5. Uncertainty in the air predictions arises from the following assumptions made in the model (COG 2013):

- The activity in the plume has a normal distribution in the vertical plane.

- The effects of building-induced turbulence on the effective release height and plume spread have been generalized, while data suggest that effects of building wakes vary substantially depending upon the geometry of the buildings and their orientation with respect to wind direction.

- A given set of meteorological and release conditions leads to a unique modelled air concentration, whereas in reality measured concentrations can vary by a factor of 2 under identical conditions.

Considering the conservatism in the estimation of releases, and in the air model, it is reasonable to conclude that doses arising from closure activities have not been underestimated.

6.3 Effects Assessment

6.3.1 Toxicological Benchmarks

This section is not applicable as no non-radiological COPCs were identified for ecological receptors for the closure phase.

6.3.2 Radiation Benchmarks

Radiation dose benchmarks of 0.4 mGy/h (9.6 mGy/d) and 0.1 mGy/h (2.4 mGy/d) (UNSCEAR 2008) were selected for the WL assessment of effects on aquatic biota and terrestrial biota, respectively, as recommended in the CSA N288.6-12 standard (CSA 2012). This is a total dose benchmark, therefore the dose to biota due to each radionuclide of concern is summed to compare against this benchmark.

The aquatic biota dose benchmark of 10 mGy/d was initially developed by the National Council on Radiation Protection and Measurements (NCRP) (1991) and was recommended by the IAEA (1992) which concluded that limiting the dose rate to individuals in an aquatic population to a maximum of 10 mGy/d would provide adequate protection for the population. Later reviews by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) (1996, 2008) have supported this recommendation.

The aquatic biota considered by UNSCEAR are organisms such as fish and benthic invertebrates that reside in water. Birds and mammals with riparian habits are considered to be terrestrial biota. Dose calculations in this ERA follow the same convention.

For terrestrial biota, a level of 1 mGy/d has been widely used as an acceptable level based on IAEA (1992) and UNSCEAR (1996). More recently, UNSCEAR (2008) has supported a slightly higher exposure level of 0.1 mGy/h (2.4 mGy/d) as the threshold for effects of population significance in terrestrial organisms. UNSCEAR (2008) updated its review of radiation effects on natural biota, and noted that the 0.04 mGy/h (1 mGy/d) exposure produced no effect in the most sensitive mammalian study (with dogs), while 0.18 mGy/h produced eventual sterility. Therefore, UNSCEAR chose an intermediate exposure level of

0.1 mGy/h (2.4 mGy/d) as the threshold for effects of population significance in terrestrial organisms. UNSCEAR concluded that lower dose rates to the most highly exposed individuals would be unlikely to have significant effects on most terrestrial communities.

It is recognized that the selection of reference dose levels is a topic of ongoing debate. For example, the CNSC has recommended dose benchmarks of 0.6 mGy/d for fish, 3 mGy/d for aquatic plants (algae and macrophytes), 6 mGy/d for invertebrates, and 3 mGy/d for mammals and terrestrial plants (EC/HC 2003). The dose benchmark for fish was based on a reproductive effects study in carp in a Chernobyl cooling pond with a history of higher exposures (Makeyeva *et al.* 1995). A value of 0.6 mGy/d was found to be in the range where both effects and no effects were observed. The aquatic plant benchmark was based on information related to terrestrial plants (conifers), which are considered to be sensitive to the effects of radiation. Reproductive effects in polychaete worms were used to derive the dose benchmark for benthic invertebrates.

The International Commission on Radiological Protection (ICRP) (2008) has suggested "derived consideration levels" as a range of dose rates reflecting a range in potential for effect, for each of several taxonomic groups. The ICRP states that the ranges of dose rates they provide are preliminary and need to be revised as more data become available.

Considering the history and discussions surrounding the selection of radiation benchmarks, 0.4 mGy/h (9.6 mGy/d) and 0.1 mGy/h (2.4 mGy/d) (UNSCEAR 2008) were selected for the assessment of effects on aquatic biota and terrestrial biota, respectively. These benchmarks were recommended in CSA N288.6 (2012), and are appropriate for this assessment.

6.3.3 Uncertainties in the Effects Assessment

Radiation dose benchmarks for biota are a topic of ongoing debate. Uncertainties exist related to some low values that have been suggested based on field studies around Chernobyl. The radiation dose benchmarks chosen follow UNSCEAR (2008) and CSA N288.6-12 (CSA 2012) in giving more credence to values based on controlled laboratory studies and demonstrated low levels of effect.

6.4 Risk Characterization

6.4.1 Risk Estimation

Non-radiological COPCs have not been identified for the closure phase, as per Section 4.1.2.2 therefore risk estimates are not applicable.

The total doses are compared to the dose benchmarks of 9.6 mGy/d for aquatic biota and 2.4 mGy/d for terrestrial and riparian biota. A summary of the total dose for each ecological receptor is provided in Table 6-10 along with a comparison to their respective dose benchmarks.

Table 6-10: Summary of Total Dose for Ecological Receptors during Closure and Comparison to Dose Benchmarks

Ecological Receptor	Dose (mGy/d)			
	Demolition Prior to Grouting (Max)	Demolition Prior to Grouting (Avg)	Grouting (Max)	Grouting (Avg)
American Robin	5.27E-05	1.39E-05	8.57E-06	4.82E-06
Loggerhead Shrike	7.86E-05	2.07E-05	8.83E-06	4.93E-06
Meadow Vole	9.71E-06	2.56E-06	8.04E-06	4.47E-06
Common Shrew	4.84E-05	1.27E-05	8.98E-06	4.97E-06
Deer	1.38E-04	3.62E-05	1.03E-05	5.71E-06
Rabbit	1.70E-03	4.48E-04	1.06E-05	5.84E-06
Red Fox	1.28E-04	3.37E-05	7.31E-06	4.03E-06
Little Brown Bat	1.50E-05	3.95E-06	4.49E-06	2.59E-06
Forage	5.11E-04	1.34E-04	1.70E-05	9.46E-06
Grass	5.15E-04	1.35E-04	2.54E-05	1.39E-05
Fruits	3.95E-05	1.04E-05	5.74E-06	3.57E-06
Earthworm	9.18E-05	2.41E-05	9.29E-06	5.44E-06

Notes:
Bold and shaded cells indicate exceedance of the terrestrial benchmark of 2.4 mGy/d.

6.4.2 Discussion of Chemical and Radiation Effects

6.4.2.1 Likelihood of Effects

There are no exceedances of the 2.4 mGy/d radiation benchmark for terrestrial and riparian biota on or near the WL site, as shown in Table 6-10. All predicted doses are well below this level. Therefore, it is unlikely that there would be significant adverse effects on terrestrial populations or communities as a result of radionuclide releases from closure activities.

6.4.3 Uncertainties in the Risk Characterization

There are uncertainties associated with the components contributing to the overall risk assessment. This includes receptor exposure factors, such as transfer factors, intake rates and bioaccumulation factors, and dose coefficients (discussed in Section 6.2.7), as well as benchmark values used to determine risk of potential effects (discussed in Section 6.3.3).

Overall, considering uncertainties in the exposure assessment and in the benchmark values, the risk characterization has been undertaken in a manner that has not underestimated risk; the results are either overestimates or realistic estimates of risk, both of which are considered acceptable.

7.0 ECOLOGICAL RISK ASSESSMENT – POST-CLOSURE

7.1 Problem Formulation

7.1.1 Receptor Selection and Characterization

During the post-closure phase, the focus is on aquatic and riparian VCs, because releases are only expected via groundwater to surface water pathways. Aquatic and riparian ecosystems are described in this section. VCs selected for the closure phase are presented in Section 6.1.1. The VCs selected for the post-closure assessment are based on a number of considerations:

- VCs or species identified, studied or sampled in previous reports:
    - Atomic Energy of Canada Limited (AECL). 2001. Appendix G: Whiteshell Laboratories Decommissioning Project, Comprehensive Study Report, Volumes 1: Main Report. Atomic Energy of Canada Limited, WLDP-30702-041-000, REV 2, March 2001;
    - Canadian Nuclear Laboratories (CNL) Environmental Monitoring at Whiteshell Laboratories Annual Safety Reports for 2011 to 2015.
    - CNL. 2016a. Environmental Assessment (and/or Environmental Effects Review). *In Situ* Decommissioning of the WR-1 Reactor at the Whiteshell Laboratories Site, WLDP-03700-ENA-001, Revision 0, April 2016.
    - CNL. 2016d. Memo: Results of 2015 bat survey at Whiteshell Labs. From: M. Murrant To: L. Wilson, K. Ross. Dated: 2016/10/07;
- The habitat and land use of the Study Area;
- Exposure pathways;
- Lists of threatened and endangered species under the federal Species at Risk Act (SARA), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Manitoba Endangered Species and Ecosystems Act (ESEA) that are likely to be present in the vicinity of the site or the Winnipeg River;
- Master list of species sightings reported by Whiteshell Staff between 2014 and 2016 in relation to the Study Area;
- Ecological and socio-economic significance;

- Traditional and cultural importance – since the Revision 1 of the ERA was submitted in 2017, additional information from Indigenous Engagement was available on potential VCs and used in the assessment, including;
    - Sagkeeng Anicinabe Land use and Occupancy Study (Olson and Firelight Research Inc 2018);
    - Manitoba Métis Traditional Knowledge, Land Use, and Occupancy Study (Shared Value Solutions 2019);
    - Indigenous Food Intake Survey (CNL 2018a);
- The suggested criteria listed in Table 7.1 of CSA N288.6 (2012); and
- Professional judgement.

The aquatic habitat for the Study Area consists of the Winnipeg River that passes adjacent to the site. The River is approximately 500 m west of the WR-1 site and is the main on-site aquatic habitat. Forage fish species such as minnows and predator fish species such as Walleye, Northern Pike, Smallmouth Bass, Mooneye, and Lake Trout are supported by the Winnipeg River. Lake Sturgeon, a species at risk, is also found in the Winnipeg River (COSEWIC 2017).

Aquatic invertebrate studies conducted on the Winnipeg River in the early 1970s and mid-1990s reported many species of zooplankton and benthic fauna. Benthic fauna included protozoa, ostracods, nematodes, oligochaetes, leeches, mysids, crayfish, amphipods, mollusks, mussels and aquatic insects (AECL 2001).

Aquatic plants such as bulrushes, cattails and wild rice have been identified along the banks of the Winnipeg River. Although, wild rice is harvested in the region, the waters near WL do not support wild rice. The Winnipeg River also supports a diverse assemblage of algae (phytoplankton) (AECL 2001).

Gullies and ravines are found along the Winnipeg River. These gullies and ravines provide ideal habitat for beavers and result in beaver ponds on-site. These ponds, however, are drained after a few years. The site also contains two sewage lagoons that support aquatic plants and animals. Man-made ditches that carry water during spring run-off are also present on-site but are not likely to provide an ideal aquatic habitat for plants and animals because they are dry in the summer (AECL 2001).

The VCs selected for assessment during the post-closure phase are provided in Table 7-1 along with their rationale for inclusion, consistent with suggested criteria in CSA N288.6-12 (2012). The VCs were selected to represent each major plant and animal group, reflecting the main ecological exposure pathways, feeding habits and habitats at or around the site. In making the selection, species that were ecologically similar to other species and could be represented by another species, were not selected, in order to reduce redundancy in the

exposure calculations. Further descriptions regarding the chosen VCs, such as habitat and feeding habits, are provided in Appendix A.

Table 7-1: VCs Selected for the Post-Closure Phase

Organism Category	Species	Selection Criteria				Applicable Selection Criteria	Scenario
		1 Major Plant or Animal Group	2 Facility or Stakeholder Importance	3 Socio-economic/ ecological Significance	4 Exposed to and/or Sensitive to Stressor		
Terrestrial Birds	Barn Swallow	Aerial feeding insectivore	Present on-site	On-site breeder. Identified as a SAR under COSEWIC. A surrogate for aquatic insect eating birds including various SAR under COSEWIC, ESEA or SARA (e.g., Bank Swallow, Chimney Swift, Common Nighthawk, Eastern Wood Pewee, Olive-sided Flycatcher, Piping Plover, Whip-poor-will, and Yellow Rail)	Exposed to aquatic release through ingestion of aerial stages of benthic invertebrates	Selected as VC: 1, 2, 3, 4	Post-Closure
Mammals	Little Brown Myotis (Bat)	Insectivore	Present on-site. Bats observed roosting in forested areas of the site	Identified as a SAR under COSEWIC, ESEA and SARA. A surrogate for the Northern Myotis identified as SAR under COSEWIC, ESEA and SARA	Exposed to aquatic release through ingestion of aerial stages of benthic invertebrates	Selected as VC: 1, 2, 3, 4	Post-Closure
	Moose	Terrestrial herbivore	Present on-site (limited)	Game animal for Indigenous people.	Exposed to aquatic release through ingestion of aquatic plants	Selected as VC: 1, 2, 3, 4	Post-Closure
Fish	Carmine Shiner	Benthopelagic forage fish	Present in the Winnipeg River.	Identified as a SAR under COSEWIC, and SARA. A food source for other VCs.	Exposed to aquatic release through	Selected as VC: 1, 2,3, 4	Post-Closure

Organism Category	Species	Selection Criteria				Applicable Selection Criteria	Scenario
		1 Major Plant or Animal Group	2 Facility or Stakeholder Importance	3 Socio-economic/ ecological Significance	4 Exposed to and/or Sensitive to Stressor		
	Lake Sturgeon	Benthic forage fish	Northern Pike, Walleye, and Lake Sturgeon identified in AECL (2001).	Identified as a SAR under COSEWIC.	surface water and sediment.		
	Walleye	Pelagic predator fish		A sport fish. A surrogate for other pelagic fish in the Winnipeg River such as Northern Pike and Mooneye	Exposed to aquatic release through surface water.		
Aquatic Plants	Submerged and emergent macrophyte	Aquatic plant	Present in the Winnipeg River	A food source for other VCs	Exposed to aquatic release through surface water	Selected as VC: 1, 2, 3, 4	Post-Closure
Aquatic Invertebrates	Benthic invertebrates	Benthic invertebrates	Present in the Winnipeg River	A food source for other VCs	Exposed to aquatic release through surface water and sediment	Selected as VC: 1, 2, 3, 4	Post-Closure
Riparian Birds	Horned Grebe	Diving - invertebrates and fish	Present in the area	Identified as a species of special concern under COSEWIC. A food source for other VCs. Surrogate for other important species such as the common loon and red-necked grebe	Exposed to aquatic release through ingestion of water, benthic invertebrates, and fish	Selected as VC: 1, 2, 3, 4	Post-Closure

Organism Category	Species	Selection Criteria				Applicable Selection Criteria	Scenario
		1 Major Plant or Animal Group	2 Facility or Stakeholder Importance	3 Socio-economic/ ecological Significance	4 Exposed to and/or Sensitive to Stressor		
	Trumpeter Swan	Dabbling - aquatic plants	Present on-site	Identified as a SAR under ESEA	Exposed to aquatic release through ingestion of water and aquatic plants		
	Mallard	Dabbling - aquatic plants and invertebrates	Present on-site	Representative of various waterfowl along the Winnipeg River. A food source for other VCs and human receptors.	Exposed to aquatic release through ingestion of water, aquatic plants and benthic invertebrates		
Riparian Mammals	Mink	Carnivore	Present in the area.	Mink are commonly trapped on the trap lines in the Whiteshell game hunting area	Exposed to aquatic release through ingestion of water, waterfowl and fish	Selected as VC: 1, 2, 3, 4	Post-Closure

7.1.1.1 Consideration of Species at Risk

Table 6-2 lists a number of threatened and endangered species under the federal SARA, COSEWIC, and the Manitoba ESEA that are likely to be present in the vicinity of the site or the Winnipeg River. The possible presence of these species on the site was indicated by the Manitoba Conservation Data Centre (CNL 2016a). Species at risk are also discussed in the EIS (Section 6.5).

Several Species that have a Species at Risk Status under SARA, COSEWIC and ESEA have also been sighted on-site. The last date that these species were observed on the site by Whiteshell Staff is presented in Table 6-2.

Species at risk were considered as part of the VC selection. They can be difficult to include in dose and risk calculations due to incomplete knowledge of their exposure factors. While not all SAR are specifically assessed, an effort was made to ensure that the selected VCs include species with similar feeding habits, so that surrogate species from the VC list can be used to infer dose and risk for the SAR species either present or potentially present on the WL site. The surrogate selection is discussed in more detail in Appendix A.

7.1.2 Assessment and Measurement Endpoints

Assessment endpoints are explicit expressions of the environmental values that are to be protected (FCSAP 2012). Assessment endpoints should include the VC and the attribute of the VC that is to be protected (e.g., abundance, viability of the population) (FCSAP 2012). The assessment endpoints to be evaluated during the post-closure phase in this EcoRA are presented in Table 7-2.

Measurement endpoints are conceptually related to assessment endpoints and are defined as the specific measures that will be used to judge potential for effect on the attribute of an assessment endpoint (e.g., if we predict an effect on organism growth or reproduction, we can infer a potential for effect on abundance). Measurement endpoints are the foundation for the lines of evidence that are used to estimate risks to VCs (FCSAP 2012).

In this EcoRA, the assessment endpoints for most VCs are at the population or community level. For Species at Risk the assessment endpoint is the individual level. While exposure and risk estimates always pertain to individuals, for most VCs, when effects on individuals are predicted from contaminant levels in a certain location, further discussion of population or community effects (or lack thereof) is appropriate. For Species at Risk, it is considered that effects on even a few individuals represent an effect on the population.

Table 7-2: Assessment Endpoints, Measurement Endpoints, and Lines of Evidence during Post-Closure

Valued Components	Level of Protection	Protection Goal	Assessment Endpoint	Lines of Evidence	
				Line of Evidence	Use of Measurement Endpoints for Specific LOEs
Bottom Feeding Fish (Lake Sturgeon)	Population	Maintenance of bottom feeding fish populations in Winnipeg River as source of food for piscivorous fish and wildlife.	Viability of bottom-feeding fish populations	Water Chemistry	Comparison of COPC concentrations to growth, survival and reproduction toxicological reference values (low-effect threshold concentrations).
				Radiological Dose	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Pelagic Fish (Carmine Shiner, Walleye)	Population	Maintenance of pelagic fish populations in Winnipeg River as source of food for piscivorous fish and wildlife.	Viability of pelagic fish populations.	Water Chemistry	Comparison of COPC concentrations to growth, survival and reproduction toxicological reference values (low-effect threshold concentrations).
				Radiological Dose	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.

Valued Components	Level of Protection	Protection Goal	Assessment Endpoint	Lines of Evidence	
				Line of Evidence	Use of Measurement Endpoints for Specific LOEs
Aquatic Plants	Population	Maintenance of aquatic plant populations in Winnipeg River as a source of food and cover for wildlife.	Viability of aquatic plant populations.	Water Chemistry	Comparison of COPC concentrations to growth, survival and reproduction toxicological reference values (low-effect threshold concentrations) for aquatic plants.
				Radiological Dose	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Benthic Invertebrates	Community	Maintenance of a diverse aquatic and benthic invertebrate community in Winnipeg River as source of food for fish and wildlife.	Richness, diversity, abundance of benthic invertebrates.	Water Chemistry	Comparison of COPC concentrations to water quality guidelines.
				Sediment Chemistry	Comparison of COPC concentrations to sediment quality guidelines.
				Radiological Dose	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.

Valued Components	Level of Protection	Protection Goal	Assessment Endpoint	Lines of Evidence	
				Line of Evidence	Use of Measurement Endpoints for Specific LOEs
Riparian Birds (Horned Grebe, Trumpeter Swan, Mallard)	Population	Maintenance of riparian bird populations along Winnipeg River shoreline as source of food for predatory wildlife.	Viability of aquatic riparian bird populations	Radiological and Toxicological Doses	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Riparian Mammals (Mink)	Population	Maintenance of riparian mammal population along Winnipeg River shoreline as source of food for predatory wildlife.	Viability of aquatic riparian mammal populations		
Terrestrial Birds (Barn Swallow)	Population	Maintenance of the terrestrial bird population at the WL site.	Viability of terrestrial bird populations	Radiological and Toxicological Doses	Comparison of estimated doses of COPCs to growth, survival and reproduction benchmark values (low-effect threshold doses) relevant to the assessment endpoint.
Terrestrial Mammals (Moose, Little Brown Myotis*)	Population	Maintenance of terrestrial mammal population at the WL site.	Viability of terrestrial mammal populations		

Notes:
LOE: Line of evidence
* For species at risk, protection is at the individual level, recognizing that effects on even a few individuals represent an effect on the population.

7.1.3 Selection of Chemical, Radiological, and Other Stressors

For the post-closure phase, the relevant chemical and radiological contaminants may be released via leakage through the WRDF to groundwater and subsequent migration via groundwater to surface water at the Winnipeg River.

Existing concentrations (background) in surface water and sediment were included in the assessment where available. This provides an evaluation of the cumulative effects of Project inputs and existing conditions.

7.1.3.1 Selection of Radiological COPCs

The radionuclides released from groundwater to the surface water environment during post-closure are presented in Section 5.1.2.1 and apply as well for the EcoRA during post-closure.

7.1.3.2 Selection of Non-Radiological COPCs

As discussed in Section 0, the groundwater model predicted mass loadings for non-radionuclides from WRDF to groundwater for the duration of the modelling assessment timeframe (500,000 years). Maximum mass loadings for each non-radionuclide were converted to groundwater concentrations using the anticipated flowrate through the WRDF for the time period of maximum mass loadings. The maximum predicted groundwater concentrations were compared to the more conservative of available federal and provincial guidelines and objectives to determine potential COPCs relevant to ecological health. If there was no such guideline or objective, screening criteria were obtained from conservative toxicity benchmarks (e.g., no effect levels) in the literature.

The maximum predicted concentrations were compared to the following criteria to determine potential COPCs relevant to ecological health, in order of preference as shown in Figure 7-1:

- Manitoba Water Quality Standards, Objectives, and Guidelines (MWS 2011)
- CCME Water Quality Guidelines for Protection of Aquatic Life (CCME 1999)
- Ontario Provincial Water Quality Objectives (MOEE 1994);
- British Columbia Water Quality Guidelines (BC MOE 2017)
- Toxicity data from Borgmann et al. (2005), Suter and Tsao (1996), or for HB-40 from EcoMetrix (2017).

Non-radionuclides with maximum concentrations exceeding the most conservative of these benchmarks according to the hierarchy shown in Figure 7-1 were carried forward as non-radiological COPCs in this assessment. Based on the screening shown in Table 7-3,

cadmium, lead, HB-40, and xylene are carried forward for further quantitative assessment in the EcoRA for the post-closure phase.

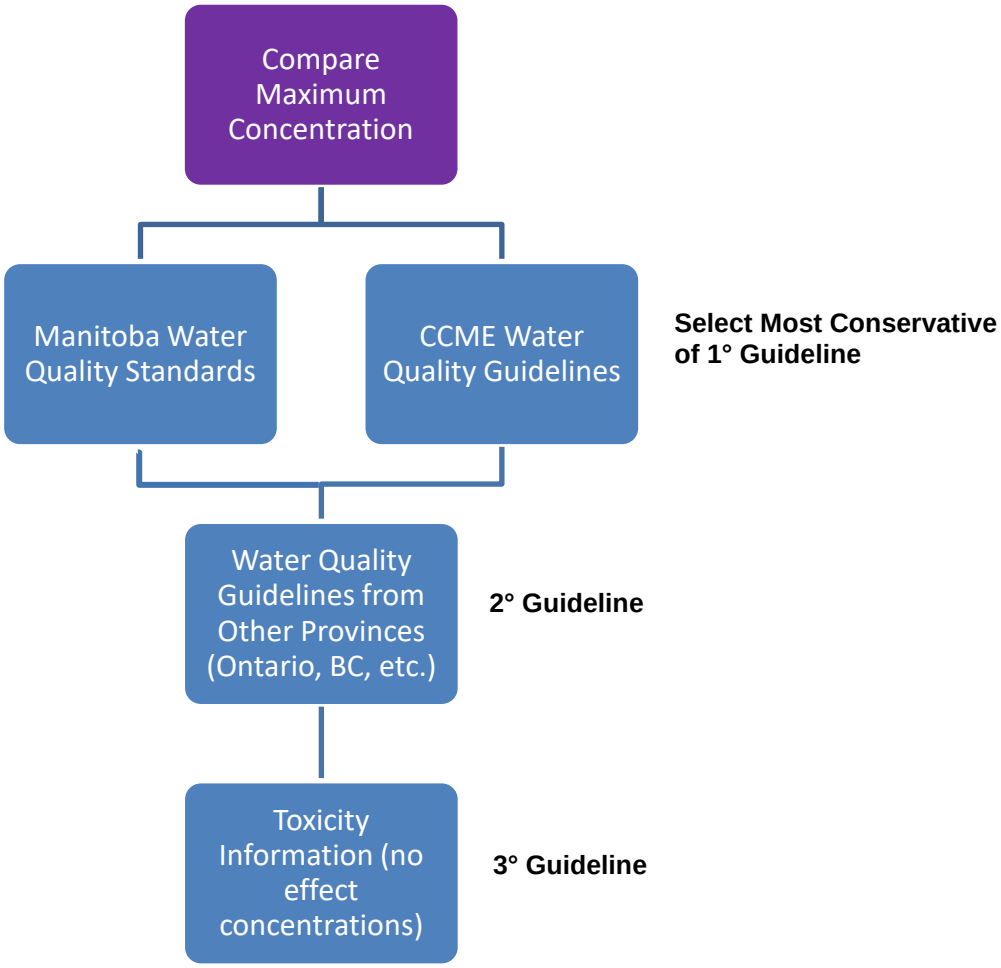

Figure 7-1: Selection Process for Ecological Health Screening of Non-Radiological COPCs

Table 7-3: Ecological Health Screening of Non-Radiological Parameters in Surface Water

Non-radionuclide	Groundwater concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Argon	1.11E-10	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Boron	2.84E-03	1.00E+01		1500	200	1200	-	CCME WQG	No
Barium	2.62E-07	1.10E+01					0.4	LCV/10 – Suter and Tsao 1996	No
Bismuth	1.61E-07	<2.00E-01					0.25	LC_{50}/100 – Borgmann *et al.* 2005	No
Cadmium	**5.35E+00**	1.00E-02	0.137	0.08	0.1	0.114	-	CCME WQG	**Yes**
Cobalt	3.05E-01	2.00E-01			0.9	4	-	PWQO Ontario	No
Chromium	3.49E-02	1.70E+00	37.1	1.0 (VI)	1 (VI)		-	CCME WQG	No
Copper	7.89E-03	1.40E+01	4.3	2	5	2	-	CCME WQG	No
Gadolinium	1.04E-04	-					1.5	LC_{50}/100 – Borgmann *et al.* 2005	No
HB-40	5.84E+02	0.00E+00					2	IC_{25}/10 – EcoMetrix 2017	**Yes**
Helium	1.73E-01	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Mercury	6.00E-04	1.00E-02	1	0.026	0.2		-	CCME WQG	No
Potassium	4.72E-06	9.07E+02					5300	LCV/10 – Suter and Tsao 1996	No
Potassium hydroxide (as K)	5.37E-01	-					5300	LCV/10 – Suter and Tsao 1996	No
Manganese	1.20E-03	1.10E+01				794.2	110	WQG BC	No
Molybdenum	1.69E-01	2.00E-01		73	40	1000	-	CCME WQG	No
Nitrogen	7.84E-03	-				3000		WQG BC	No
Nickel	6.94E-04	1.78E+00	25.5	25	25		-	CCME WQG	No
Lead	**7.27E+01**	2.60E+00	0.99	1	3	4.4		WQSOG Manitoba	**Yes**
Palladium	1.51E+00	-					5.7	LC_{50}/100 – Borgmann *et al.* 2005	No
Ruthenium	8.87E-08	-					10	LC_{50}/100 – Borgmann *et al.* 2005	No
Sulphur (as SO_4)	1.14E-10	-				218000		WQG BC	No

Non-radionuclide	Groundwater concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Samarium	5.26E-11	-	-	-	-	-	0.74	LC_{50}/100 – Borgmann *et al.* 2005	No
Xenon	2.24E-08	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Xylene	**6.96E+01**	-	-	-	2/40/30 (m/o/p)	30	-	WQG BC (in preference over interim PWQO)	**Yes**
Zirconium	2.18E-09	-	-	-	4	-	-	PWQO Ontario	No

Notes:
*Noble gases were assumed to volatilize rapidly.
Background water quality was obtained from Section 6.4.2, Table 6.4.2-5 of the EIS
WQSOG = Manitoba Water Quality Standards, Objectives and Guidelines (MWS 2011)
CCME WQG = Canadian Council of Ministers of the Environment Water Quality Guideline (CCME 1999)
PWQO = Ontario Provincial Water Quality Objective (MOEE 1994)
WQG BC = Water Quality Guideline British Columbia (BC MOE 2017)

7.1.4 Selection of Exposure Pathways

Exposure pathways include the routes of contaminant dispersion from the source to the receptor location, and the routes of contaminant transport through the food chain or other media to the receptor organism. Airborne COPCs are not relevant during the post-closure phase.

For fish and aquatic plants, contact with water and contaminant uptake from water via bioaccumulation represents the main exposure pathway. The dominant exposure pathways for birds and mammals are through the uptake of contaminants via the ingestion of water, incidental ingestion of soil or sediment, and ingestion of food.

7.1.5 Ecological Conceptual Model

The conceptual model illustrates how receptors are exposed to COPCs. It identifies the source of contaminants, receptor locations and the exposure pathways to be considered in the assessment for each receptor. Exposure pathways represent the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or (for radionuclides) how they may exert effects from outside the body. Table 7-4 summarizes the relevant exposure pathways for each type of ecological receptor. The conceptual model for the EcoRA is illustrated in Figure 7-2.

Table 7-4: Complete Exposure Pathways for Selected VC Species during Post-Closure

VC Category	VC	Exposure Pathways	Environmental Media
Bottom Feeding Fish	Lake Sturgeon	Direct Contact	In Water On Sediment
	Carmine Shiner	Direct Contact	In Water On Sediment
Pelagic Fish	Walleye	Direct Contact	In Water
Aquatic Plants	Aquatic Plant	Direct Contact	In Water
Aquatic Invertebrates	Benthic Invertebrate	Direct Contact	In Water In Sediment
Riparian Birds	Horned Grebe	Direct Contact	On Sediment
		Ingestion	Water Sediment Fish (forage) Benthic Invertebrates
	Trumpeter Swan	Direct Contact	On Sediment
		Ingestion	Water Sediment Aquatic Plants
	Mallard	Direct Contact	On Sediment
		Ingestion	Water Sediment Benthic Invertebrates Aquatic Plants
Riparian Mammals	Mink	Direct Contact	On Sediment
		Ingestion	Water Sediment Benthic Invertebrates Fish (forage)
Terrestrial Birds	Barn Swallow	Direct Contact	On Sediment
		Ingestion	Water Sediment Benthic Invertebrates
Terrestrial Mammals	Little Brown Myotis	Direct Contact	None
		Ingestion	Water Benthic Invertebrates
	Moose	Direct Contact	On Sediment
		Ingestion	Water Sediment Aquatic Plants Grasses

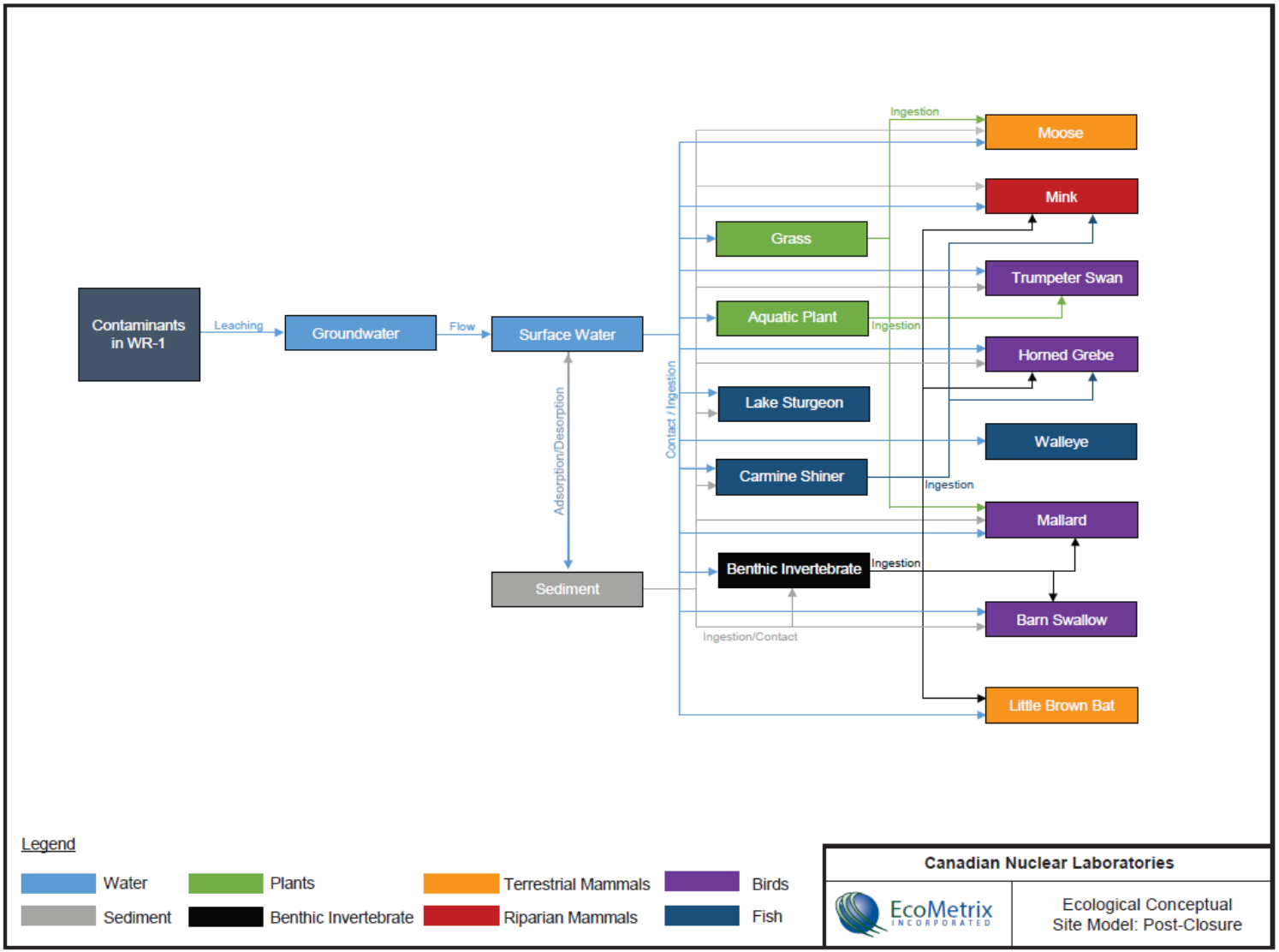

Figure 7-2: Ecological Conceptual Model for the Post-Closure Phase

7.1.6 Uncertainty in Problem Formulation

The EcoRA problem formulation is conservative in its assumptions to accommodate uncertainties and meet the objective of protecting ecological health during the post-closure phase.

Maximum predicted groundwater concentrations were selected for COPC screening; this is considered conservative and is not reflective of typical ecological exposures in the receiving environment.

The ecological screening benchmarks for water were generally the lower of applicable provincial and federal aquatic life objectives and guidelines, which is a conservative approach, ensuring that the list of COPCs would be as comprehensive as possible. Uncertainties were also inherent in the selected ecological screening benchmarks. Several of the screening benchmarks were based on Lowest Observed Adverse Effect Levels (LOAELs), but these were divided by 10 to estimate a No Observed Adverse Effect Levels (NOAELs), which is conservative. These values represent the best available screening criteria for the non-radionuclides in question, and are considered to be suitable for screening purposes in the context of a risk assessment

The ecological conceptual model is considered to be complete for the majority of ecological exposures in the vicinity of the WL site. The comprehensive selection of COPCs and receptors is expected to represent all important exposures to contaminants in the vicinity of the WL site.

There is uncertainty in the radiological and non-radiological release rates to the surface water environment; however, the estimates are expected to be conservative.

7.2 Exposure Assessment

7.2.1 Exposure Points

Exposure point concentrations were derived from estimated release rates by modelling of aquatic dispersion and subsequent partitioning of COPCs to other media in IMPACT™ 5.5.1, as described in Section 4.2.5.

Ecological receptors such as fish and aquatic plants in the post-closure phase were assumed to be located where the groundwater seep enters the Winnipeg River. Although the *Fisheries Act* prohibits the discharge of deleterious substances, the Act includes provision for the authorization of discharges for certain industries (e.g., metal mine, pulp and paper mills). In these instances, allowance for mixing zones is considered appropriate under the condition that the discharge is not acutely lethal. This same concept is also seen in provincial regulation (e.g., provincial operating permits and approvals). In this assessment we have allowed for nearfield mixing of the groundwater that is released from WRDF, as this provides a realistic assessment of aquatic organism exposure, and follows the spirit of federal and provincial regulation. Sessile organisms, such as benthic

invertebrates may be more directly exposed to groundwater, if located at the point of discharge; therefore, it has been conservatively assumed that benthic invertebrates at the site are exposed to direct groundwater without any dilution.

Mammals and birds were assumed to be located on the river bank, as shown in Figure 7-3.

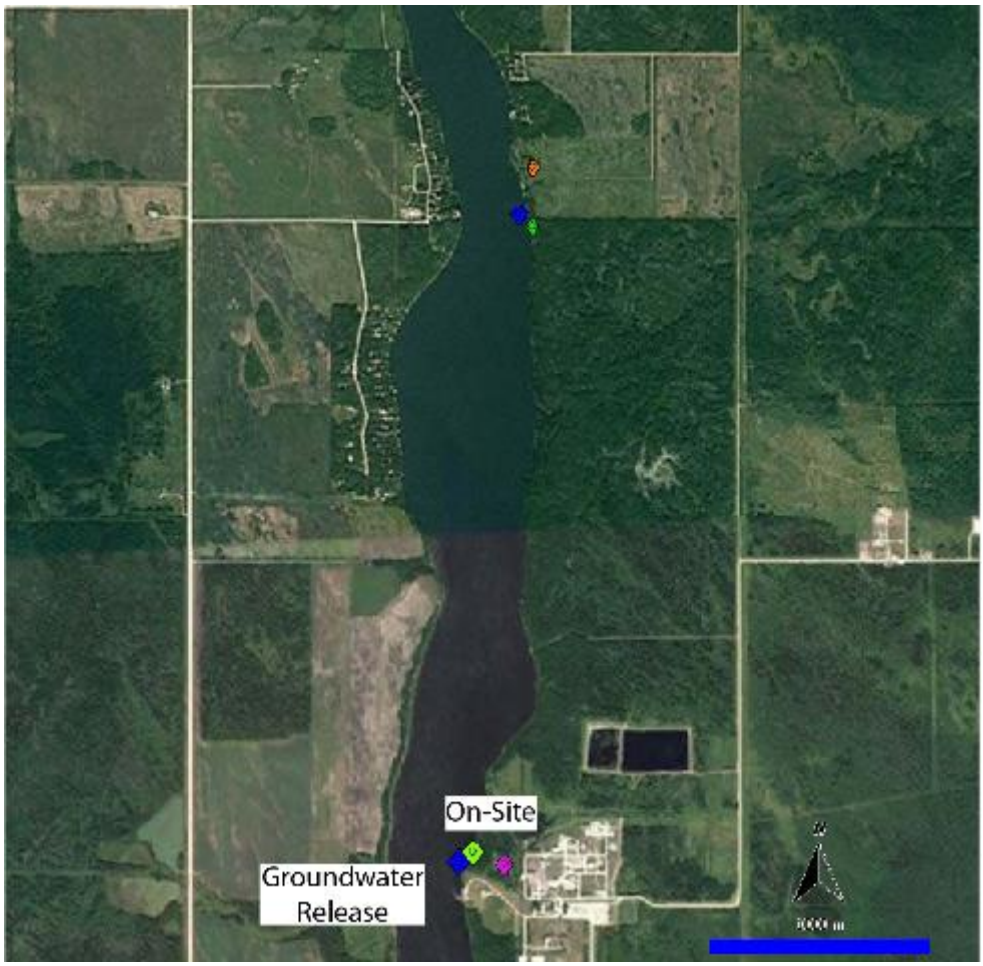

Figure 7-3: Location of Ecological Receptors in Post-Closure Phase

7.2.2 Exposure Averaging

Birds and mammals are likely to experience something close to average concentrations as they move around their home range area. For less mobile organisms such as plants and invertebrates, both average and upper limit concentrations represent exposures that would be experienced by some organisms on a long-term basis.

For this assessment, birds and mammals were considered to spend all of their time at the exposure location. This is conservative for mobile birds and mammals on-site as they are likely to spend time offsite at lower exposure concentrations. No adjustment for home range has been included.

7.2.3 Exposure and Dose Calculations

Radiological dose calculations were estimated using the EcoMetrix Incorporated software IMPACT™ DRL Version 5.5.1 (IMPACT™). IMPACT™ is consistent with the COPC transport equations outlined in CSA N288.1 (2014) and with the methods of biota dose calculation outlined in CSA N288.6 (2012). IMPACT™ uses specific activity models for tritium and C-14 as per CSA N288.1 (2014) and as recommended by CSA N288.6 (2012).

The organism exposure and dose equations are provided in Section 5.2.3.

7.2.4 Exposure Factors

There are several COPC- and biota-specific exposure factors required for the dose calculations. These parameters include intake rates, body weights, occupancy factors, BAFs, TFs, and dose coefficients (DCs).

The body weight and intake rates are required for the calculation of exposure to birds and mammals, and are presented in Table 7-5.

Biota are assumed to reside in the WL site 100% of the time. An occupancy factor is defined as the fraction of time the receptor species spends in or on various media. The occupancy factors are based on the experience and judgement of the risk assessor and the known behaviour of the receptor.

BAFs relate the COPCs in the environmental media to the concentration in the receptor. BAFs were used to calculate COPC concentrations in plant, invertebrate and fish tissues. These factors vary throughout the literature, but were generally obtained from CSA (2014) and IAEA (2010).

Transfer factors represent the fraction of daily COPC intake transferred to the tissue of birds and mammals. Ingestion transfer factors are COPC and biota-specific. Transfer factors from feed to tissue for agricultural livestock are available in CSA (2014). An allometric equation (transfer proportional to a -3/4 power of body weight) (CSA 2012), was applied to transfer factors available for beef, rabbit and poultry, to estimate the transfer factors for the bird and mammal receptors.

For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6. The order of preference for exposure factors for cadmium and lead was IAEA (2010), Sheppard et al (2010), and then a surrogate approach

Radiation dose coefficients (DCs) are used for terrestrial and aquatic biota to calculate the radiation dose. These DCs were taken from ICRP (2008) and the ERICA Tool (2016). Surrogate species from these sources were selected to represent the VCs, considering similarities in body size and likely external exposure media. The DC values in ICRP (2008) do not incorporate radiation quality factors for relative biological effectiveness (RBE) for low

beta and alpha components. Therefore, the “low beta” components of the DCs were multiplied by 2, and the alpha components were multiplied by 10 (as per CSA N288.6-12) in order to represent the greater relative effectiveness of these components.

The DCs include contributions from both parent and daughter nuclides (if any) for daughters with half-lives of less than 10 days. Both ICRP (2008) and ERICA Tool (2016) assume that the parent and daughter are in secular equilibrium. For daughter nuclides with half-lives greater than 10 days that will be in or near equilibrium with the parent over a relevant timeframe for ingrowth, secular equilibrium has been assumed and the daughter DCs have been added to the parent DCs. For external soil/sediment exposure, a relevant timeframe of 40 years was assumed, consistent with CSA N288.1-14.

The exposure factors used in this assessment are presented in Appendix B.

Table 7-5: Bird and Mammal Body Weights and Intake Rates for the Post-Closure Phase

Receptor	Body weight	Total Feed Intake[a]		Dietary Components	Feed Type Fraction	Feed Intake		Moisture[d]	Dry weight Fraction	Intake of Soil/ Sediment[e]	Basis of the Soil and Sediment Intake Value	Total Soil/ Sediment[f]	Water Intake	Inhalation[g]
	kg	kg/d dw	kg/d fw			kg/d dw[b]	kg/d fw[c]	%		%		kg DW/d	L/d	m^3/d
Birds														
Barn Swallow	0.0187	0.005	0.019	Benthic Invertebrates	1	0.005	0.019	75	0.25	2.0	Default Rate	9.72E-05	0.004	0.019
Horned Grebe	0.435 [h]	0.0338 [g]	0.14	Fish (forage) [i]	0.4	0.014	0.054	75	0.25	2.0	Default Rate	6.76E-04	0.034 [g]	0.22
				Benthic Invertebrates [i]	0.6	0.020	0.081	75	0.25					
Trumpeter Swan	10.2 [h]	0.263 [g]	1.1	Aquatic Plants [i]	1	0.264	1.055	75	0.25	2.0	Default Rate	5.27E-03	0.28 [g]	2.4
Mallard (Wild Waterfowl) [d]	1.13	0.060	0.240	Benthic Invertebrates [j]	0.4	0.024	0.096	75	0.25	2.0	CSA 2014 (US EPA 1993)	1.20E-03	0.06	0.45
				Aquatic Plants [j]	0.6	0.036	0.144	75	0.25					
Mammals														
Little Brown Myotis [k]	0.0075	0.0009	0.0037	Benthic Invertebrates (Post-Closure)	1	0.0009	0.0037	75	0.25	0	Assumed negligible (aerial)	0	0.0012	0.011
American Mink	0.82	0.029	0.11	Fish (Forage) [l]	0.85	0.024	0.098	75	0.25	2.0	Default Rate	5.74E-04	0.025	0.47
				Benthic Invertebrates [l]	0.15	0.004	0.017	75	0.25					
Moose	400	8.0	38.1	Grasses	0.8	6.1	30.5	80	0.20	2.0	Moose	0.16	20	65.9
				Aquatic Plants	0.2	1.90	7.62	75	0.25					

Notes:
FCSAP 2012 unless otherwise stated

[a] Total feed intake on a dry weight basis was estimated from the total feed intake on a fresh weight basis using the approach in Sample *et al.* 1997, and vice versa using a total wet feed to dry feed.
[b] Calculated by multiplying the Feed Type Fraction by the Total Feed Intake on fresh weight and by the Dry Weight Fraction.
[c] Calculated by multiplying the Feed Type Fraction by the Total Feed Intake on a fresh weight
[d] CSA 2014
[e] Beyer *et al*. 1994
[f] Calculated by multiplying the Total Feed Type by the fraction of the Intake of Soil/Sediment
[g] U.S. EPA (1993)
[h] Cornell Lab of Ornithology
[i] NatureServe Explorer 2015
[j] Dietary fraction from TN-11-3056 (Hart and Burt 2013)
[k] Sample and Suter 1994
[l] Dietary fraction based river habitat from US EPA (1993)
[*] Fraction of diet was assumed

7.2.5 Dispersion Models

As discussed in Section 5.2.5, the river model in IMPACT™ was used to model aquatic releases to the Winnipeg River during the post-closure phase to estimate surface water concentrations at receptor locations. IMPACT™ also calculated the subsequent partitioning of COPCs at each location.

As a separate assessment, IMPACT™ was used to model benthic invertebrate exposure to groundwater where it seeps through sediment into the river.

7.2.6 Exposure Point Concentrations and Doses

7.2.6.1 Radiological Concentrations and Doses

The estimated concentrations for ecological receptors are shown in Table 7-6. The radiological doses to all ecological receptors identified are presented for the post-closure phase for maximum release scenarios with peak release rates. A background dose from measured Cs-137 in sediment near the WL effluent outfall due to historical discharge and fallout is included in the dose calculations (Table 7-7). The 90th percentile of Cs-137 sediment data from 2010 to 2018 at the outfall was used (323 Bq/kg (dw)), from the annual monitoring reports (CNL 2020b, 2019a, 2016c). Sample calculations are presented in Appendix C.

The radiological dose to benthic invertebrates at the point of groundwater discharge is also presented for the post-closure phase, assuming direct exposure to groundwater during the time of peak release rate (Table 7-8). This is a conservative measure of exposure.

Table 7-6: Estimated Concentrations of Ecological Receptors during Post-Closure – Maximum

Radionuclide	Unit	Barn Swallow	Little Brown Bat	Carmine Shiner	Lake Sturgeon	Walleye	Freshwater plant	Benthic Invertebrate	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Mink	Moose
Ac-225	Bq/kg (fw)	2.03E-11	3.03E-16	6.12E-12	6.12E-12	6.12E-12	1.35E-09	3.14E-10	8.27E-12	4.18E-11	2.25E-11	1.18E-13	1.82E-12
Ac-227	Bq/kg (fw)	2.10E-11	3.13E-16	6.34E-12	6.34E-12	6.34E-12	1.39E-09	3.25E-10	8.55E-12	4.32E-11	2.33E-11	1.22E-13	1.89E-12
Ag-108m	Bq/kg (fw)	5.16E-10	2.99E-14	2.74E-10	2.74E-10	2.74E-10	8.48E-11	1.99E-09	4.23E-10	1.58E-10	1.95E-10	5.83E-11	2.98E-11
Bi-210	Bq/kg (fw)	6.18E-09	8.05E-12	4.35E-08	4.35E-08	4.35E-08	3.76E-08	9.52E-08	4.43E-09	2.09E-09	2.17E-09	1.57E-09	9.43E-10
C-14	Bq/kg (fw)	1.17E+01	9.65E+00	5.84E+00	5.84E+00	5.84E+00	6.05E+00	5.33E+00	1.17E+01	1.18E+01	1.18E+01	9.64E+00	1.02E+01
Ca-41	Bq/kg (fw)	1.71E-07	4.08E-10	1.10E-07	1.10E-07	1.10E-07	2.03E-05	1.32E-05	6.81E-08	1.26E-07	8.42E-08	4.49E-08	3.03E-07
Cl-36	Bq/kg (fw)	2.50E-08	1.53E-11	7.42E-09	7.42E-09	7.42E-09	7.89E-09	2.21E-08	1.21E-08	4.30E-09	5.72E-09	2.66E-09	1.60E-08
Cs-137	Bq/kg (fw)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E+00	1.35E+00	1.05E+00	5.73E-01	3.85E-01
Gd-152	Bq/kg (fw)	1.20E-16	1.76E-20	4.63E-17	4.63E-17	4.63E-17	7.72E-15	1.54E-15	4.86E-17	2.87E-16	1.51E-16	9.02E-18	1.60E-16
HTO	Bq/kg (fw)	1.54E-01	1.60E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.90E-01	1.54E-01	1.54E-01	1.54E-01	1.60E-01	2.60E-01
I-129	Bq/kg (fw)	5.82E-10	4.03E-10	6.33E-08	6.33E-08	6.33E-08	7.49E-07	1.01E-07	1.19E-09	2.65E-09	1.51E-09	3.28E-08	8.41E-08
Nb-94	Bq/kg (fw)	9.71E-24	7.41E-28	1.50E-19	1.50E-19	1.50E-19	5.99E-19	4.99E-20	1.20E-23	5.60E-23	2.76E-23	5.86E-25	1.65E-24
Ni-59	Bq/kg (fw)	2.74E-05	3.89E-08	2.86E-05	2.86E-05	2.86E-05	7.09E-05	1.36E-04	1.36E-05	7.75E-06	7.96E-06	4.42E-06	6.58E-06
Np-237	Bq/kg (fw)	2.47E-09	3.26E-12	4.51E-08	4.51E-08	4.51E-08	2.86E-06	1.23E-06	9.98E-10	2.74E-09	1.64E-09	1.37E-09	1.13E-08
OBT	Bq/kg (fw)	1.04E-02	1.33E-02	3.55E-02	3.55E-02	3.55E-02	2.79E-02	3.55E-02	1.04E-02	1.03E-02	1.03E-02	1.33E-02	1.77E-02
Pa-231	Bq/kg (fw)	5.42E-14	2.65E-17	4.23E-12	4.23E-12	4.23E-12	1.27E-10	4.18E-11	3.25E-14	8.56E-14	5.01E-14	3.80E-15	1.67E-14
Pa-233	Bq/kg (fw)	2.57E-13	1.26E-16	2.00E-11	2.00E-11	2.00E-11	6.01E-10	1.98E-10	1.54E-13	4.06E-13	2.37E-13	1.80E-14	7.78E-14
Pb-210	Bq/kg (fw)	1.35E-08	1.84E-12	8.81E-08	8.81E-08	8.81E-08	2.94E-09	1.73E-08	2.34E-08	1.16E-09	2.56E-09	1.38E-08	4.44E-10
Po-210	Bq/kg (fw)	2.02E-04	1.22E-08	4.59E-05	4.59E-05	4.59E-05	1.38E-04	5.20E-04	8.43E-05	2.56E-05	4.19E-05	1.33E-05	1.03E-05
Pu-239	Bq/kg (fw)	2.63E-09	3.86E-14	1.29E-04	1.29E-04	1.29E-04	2.46E-05	4.42E-06	2.41E-08	9.10E-09	5.27E-09	2.09E-09	3.68E-10
Pu-240	Bq/kg (fw)	6.37E-12	9.33E-17	3.12E-07	3.12E-07	3.12E-07	5.94E-08	1.07E-08	5.82E-11	2.20E-11	1.28E-11	5.06E-12	8.91E-13
Ra-223	Bq/kg (fw)	1.24E-10	6.91E-14	2.85E-11	2.85E-11	2.85E-11	8.55E-09	6.41E-09	5.25E-11	8.18E-11	5.73E-11	3.44E-11	1.56E-10
Ra-224	Bq/kg (fw)	7.74E-16	4.30E-19	1.77E-16	1.77E-16	1.77E-16	5.32E-14	3.99E-14	3.27E-16	5.09E-16	3.56E-16	2.14E-16	9.68E-16
Ra-225	Bq/kg (fw)	6.11E-11	3.39E-14	1.40E-11	1.40E-11	1.40E-11	4.20E-09	3.15E-09	2.58E-11	4.02E-11	2.81E-11	1.69E-11	7.68E-11
Ra-226	Bq/kg (fw)	1.18E-10	6.55E-14	2.70E-11	2.70E-11	2.70E-11	8.10E-09	6.07E-09	4.98E-11	7.75E-11	5.43E-11	3.26E-11	1.49E-10
Ra-228	Bq/kg (fw)	7.76E-16	4.31E-19	1.78E-16	1.78E-16	1.78E-16	5.33E-14	4.00E-14	3.28E-16	5.10E-16	3.57E-16	2.15E-16	9.81E-16
Tc-99	Bq/kg (fw)	2.92E-07	6.22E-10	2.27E-06	2.27E-06	2.27E-06	8.63E-07	1.08E-06	2.76E-07	1.14E-07	9.65E-08	3.29E-08	2.97E-08
Th-227	Bq/kg (fw)	5.56E-13	1.02E-15	4.68E-12	4.68E-12	4.68E-12	1.72E-09	8.58E-11	3.37E-12	7.61E-12	4.33E-12	2.82E-12	5.95E-12
Th-228	Bq/kg (fw)	6.87E-18	1.27E-20	5.79E-17	5.79E-17	5.79E-17	2.12E-14	1.06E-15	4.17E-17	9.41E-17	5.36E-17	3.48E-17	7.36E-17
Th-229	Bq/kg (fw)	5.48E-13	1.01E-15	4.61E-12	4.61E-12	4.61E-12	1.69E-09	8.46E-11	3.33E-12	7.51E-12	4.27E-12	2.78E-12	5.87E-12
Th-230	Bq/kg (fw)	1.05E-12	1.94E-15	8.86E-12	8.86E-12	8.86E-12	3.25E-09	1.62E-10	6.39E-12	1.44E-11	8.20E-12	5.33E-12	1.13E-11
Th-231	Bq/kg (fw)	7.26E-13	1.34E-15	6.11E-12	6.11E-12	6.11E-12	2.24E-09	1.12E-10	4.40E-12	9.94E-12	5.66E-12	3.68E-12	7.74E-12
Th-232	Bq/kg (fw)	6.84E-18	1.26E-20	5.76E-17	5.76E-17	5.76E-17	2.11E-14	1.06E-15	4.15E-17	9.36E-17	5.33E-17	3.46E-17	7.33E-17
Th-234	Bq/kg (fw)	5.02E-12	9.24E-15	4.22E-11	4.22E-11	4.22E-11	1.55E-08	7.75E-10	3.05E-11	6.87E-11	3.91E-11	2.54E-11	5.37E-11
U-233	Bq/kg (fw)	5.95E-09	2.48E-13	1.07E-10	1.07E-10	1.07E-10	1.22E-07	1.22E-08	2.37E-09	2.84E-08	1.41E-08	1.25E-11	5.02E-10
U-234	Bq/kg (fw)	1.87E-08	7.80E-13	3.36E-10	3.36E-10	3.36E-10	3.86E-07	3.86E-08	7.47E-09	8.95E-08	4.44E-08	3.93E-11	1.58E-09
U-235	Bq/kg (fw)	7.64E-09	3.18E-13	1.37E-10	1.37E-10	1.37E-10	1.57E-07	1.57E-08	3.05E-09	3.65E-08	1.81E-08	1.60E-11	6.44E-10
U-236	Bq/kg (fw)	1.03E-08	4.29E-13	1.85E-10	1.85E-10	1.85E-10	2.12E-07	2.12E-08	4.10E-09	4.92E-08	2.44E-08	2.16E-11	8.68E-10
U-238	Bq/kg (fw)	5.28E-08	2.20E-12	9.49E-10	9.49E-10	9.49E-10	1.09E-06	1.09E-07	2.11E-08	2.52E-07	1.25E-07	1.11E-10	4.45E-09

Table 7-7: Estimated Radiation Dose for Ecological Receptors during Post-Closure – Maximum

Radionuclide	Unit	Barn Swallow	Little Brown Bat	Carmine Shiner	Lake Sturgeon	Walleye	Freshwater plant	Benthic Invertebrate	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Mink	Moose
Ac-225	mGy/d	7.77E-14	1.16E-18	2.35E-14	2.35E-14	2.34E-14	5.14E-12	1.20E-12	3.16E-14	1.60E-13	8.60E-14	5.00E-16	6.95E-15
Ac-227	mGy/d	2.03E-16	3.02E-21	6.12E-17	6.12E-17	6.11E-17	1.34E-14	3.14E-15	1.67E-16	5.02E-16	3.09E-16	8.94E-17	1.82E-17
Ag-108m	mGy/d	2.24E-15	9.23E-20	2.30E-13	2.30E-13	1.13E-15	8.24E-17	1.09E-12	1.26E-13	1.25E-13	1.25E-13	1.31E-13	4.42E-16
Bi-210	mGy/d	3.28E-14	4.25E-17	2.52E-13	2.52E-13	2.31E-13	6.04E-14	3.28E-12	2.36E-14	1.11E-14	1.15E-14	8.30E-15	5.07E-15
C-14	mGy/d	7.96E-06	6.56E-06	3.97E-06	3.97E-06	3.97E-06	4.11E-06	3.58E-06	7.96E-06	8.02E-06	8.00E-06	6.56E-06	6.91E-06
Ca-41	mGy/d	6.51E-15	1.55E-17	4.21E-15	4.21E-15	4.19E-15	7.43E-13	4.88E-13	2.60E-15	4.81E-15	3.21E-15	1.71E-15	1.16E-14
Cl-36	mGy/d	9.51E-14	5.67E-17	2.82E-14	2.82E-14	2.82E-14	2.77E-14	5.91E-14	4.60E-14	1.64E-14	2.17E-14	9.84E-15	6.09E-14
Cs-137	mGy/d	0.00E+00	0.00E+00	1.10E-04	1.10E-04	0.00E+00	0.00E+00	5.73E-04	1.47E-04	1.45E-04	1.43E-04	1.48E-04	3.16E-06
Gd-152	mGy/d	3.56E-20	5.24E-24	1.38E-20	1.38E-20	1.38E-20	2.29E-18	4.59E-19	1.44E-20	8.53E-20	4.50E-20	2.68E-21	4.76E-20
HTO	mGy/d	2.13E-08	2.21E-08	2.63E-08	2.63E-08	2.63E-08	2.63E-08	2.64E-08	2.13E-08	2.13E-08	2.13E-08	2.21E-08	3.59E-08
I-129	mGy/d	6.40E-16	4.03E-16	4.82E-13	4.82E-13	6.52E-14	6.92E-13	3.43E-12	6.96E-12	6.97E-12	6.96E-12	7.76E-13	1.01E-13
Nb-94	mGy/d	5.15E-29	3.11E-33	1.56E-24	1.56E-24	7.58E-25	1.69E-24	3.85E-24	1.02E-24	1.02E-24	1.02E-24	1.02E-24	2.47E-29
Ni-59	mGy/d	2.63E-12	3.73E-15	2.80E-12	2.80E-12	2.75E-12	6.69E-12	1.71E-11	1.30E-12	7.44E-13	7.64E-13	4.24E-13	6.32E-13
Np-237	mGy/d	1.63E-12	2.15E-15	2.97E-11	2.97E-11	2.97E-11	1.88E-09	8.21E-10	6.57E-13	1.80E-12	1.08E-12	9.05E-13	7.44E-12
OBT	mGy/d	1.44E-09	1.83E-09	4.91E-09	4.91E-09	4.91E-09	3.86E-09	4.92E-09	1.44E-09	1.42E-09	1.43E-09	1.83E-09	2.44E-09
Pa-231	mGy/d	3.73E-17	1.83E-20	2.96E-15	2.96E-15	2.91E-15	8.73E-14	2.91E-14	3.17E-16	3.53E-16	3.29E-16	3.11E-16	1.15E-17
Pa-233	mGy/d	8.27E-19	3.82E-22	1.34E-15	1.34E-15	6.82E-17	1.29E-15	7.18E-15	6.42E-16	6.43E-16	6.43E-16	6.83E-16	3.59E-19
Pb-210	mGy/d	7.94E-14	1.07E-17	5.29E-13	5.29E-13	5.29E-13	1.54E-14	7.84E-14	1.38E-13	6.89E-15	1.51E-14	8.02E-14	2.66E-15
Po-210	mGy/d	1.47E-07	8.93E-12	3.42E-09	3.42E-09	3.42E-09	1.01E-07	3.87E-07	6.15E-08	1.87E-08	3.06E-08	9.68E-09	7.69E-10
Pu-239	mGy/d	1.87E-12	2.74E-17	9.15E-08	9.15E-08	9.15E-08	1.74E-08	3.19E-09	1.72E-11	6.60E-12	3.89E-12	1.63E-12	2.61E-13
Pu-240	mGy/d	4.58E-15	6.72E-20	2.25E-10	2.25E-10	2.25E-10	4.28E-11	7.72E-12	4.25E-14	1.64E-14	9.75E-15	4.22E-15	6.41E-16
Ra-223	mGy/d	4.56E-13	2.54E-16	1.14E-13	1.14E-13	1.05E-13	3.13E-11	2.36E-11	1.97E-13	3.05E-13	2.15E-13	1.31E-13	5.73E-13
Ra-224	mGy/d	2.98E-18	1.66E-21	1.05E-18	1.05E-18	6.84E-19	2.04E-16	1.55E-16	1.44E-18	2.14E-18	1.55E-18	1.01E-18	3.74E-18
Ra-225	mGy/d	6.43E-13	3.57E-16	1.57E-13	1.57E-13	1.47E-13	4.41E-11	3.32E-11	2.78E-13	4.30E-13	3.03E-13	1.85E-13	8.08E-13
Ra-226	mGy/d	3.94E-13	2.21E-16	1.48E-13	1.48E-13	9.29E-14	2.69E-11	2.03E-11	2.26E-13	3.19E-13	2.41E-13	1.75E-13	4.99E-13
Ra-228	mGy/d	6.67E-21	3.41E-24	1.95E-19	1.95E-19	2.03E-21	3.31E-19	1.23E-18	2.73E-19	2.75E-19	2.74E-19	2.72E-19	1.47E-20
Tc-99	mGy/d	4.09E-13	8.71E-16	3.18E-12	3.18E-12	3.18E-12	1.21E-12	1.39E-12	3.87E-13	1.59E-13	1.35E-13	4.61E-14	4.15E-14
Th-227	mGy/d	4.50E-16	8.28E-19	1.29E-14	1.29E-14	3.78E-15	1.39E-12	1.15E-13	2.01E-14	2.36E-14	2.09E-14	2.05E-14	4.90E-15
Th-228	mGy/d	3.08E-20	5.67E-23	1.36E-18	1.36E-18	2.59E-19	9.37E-17	1.62E-17	2.02E-18	2.25E-18	2.07E-18	2.17E-18	3.30E-19
Th-229	mGy/d	3.68E-16	6.78E-19	1.04E-14	1.04E-14	3.10E-15	1.15E-12	8.60E-14	1.07E-14	1.35E-14	1.13E-14	1.08E-14	3.96E-15
Th-230	mGy/d	6.82E-16	1.26E-18	5.82E-15	5.84E-15	5.76E-15	2.11E-12	1.07E-13	4.17E-15	9.38E-15	5.35E-15	3.50E-15	7.33E-15
Th-231	mGy/d	1.82E-18	3.34E-21	1.57E-15	1.57E-15	1.55E-17	5.38E-15	1.70E-14	2.57E-14	2.57E-14	2.57E-14	2.68E-14	2.01E-17
Th-232	mGy/d	3.83E-21	7.05E-24	3.26E-20	3.26E-20	3.22E-20	1.16E-17	5.89E-19	2.35E-20	5.27E-20	3.01E-20	1.97E-20	4.10E-20
Th-234	mGy/d	6.02E-17	1.11E-19	5.00E-14	5.00E-14	5.12E-16	1.36E-13	2.38E-12	2.44E-14	2.49E-14	2.46E-14	2.57E-14	6.44E-16
U-233	mGy/d	3.99E-12	1.66E-16	7.16E-14	7.16E-14	7.16E-14	8.21E-11	8.21E-12	1.59E-12	1.91E-11	9.46E-12	8.37E-15	3.36E-13
U-234	mGy/d	1.24E-11	5.15E-16	2.22E-13	2.22E-13	2.22E-13	2.54E-10	2.59E-11	4.93E-12	5.91E-11	2.93E-11	2.60E-14	1.04E-12
U-235	mGy/d	4.67E-12	1.94E-16	8.48E-14	8.48E-14	8.41E-14	9.61E-11	9.82E-12	1.86E-12	2.23E-11	1.11E-11	1.07E-14	3.98E-13
U-236	mGy/d	6.42E-12	2.67E-16	1.15E-13	1.15E-13	1.15E-13	1.32E-10	1.32E-11	2.56E-12	3.07E-11	1.52E-11	1.35E-14	5.41E-13
U-238	mGy/d	3.06E-11	1.28E-15	5.50E-13	5.50E-13	5.50E-13	6.31E-10	6.26E-11	1.22E-11	1.46E-10	7.27E-11	6.43E-14	2.58E-12
Total	**mGy/d**	**8.13E-06**	**6.58E-06**	**1.14E-04**	**1.14E-04**	**4.10E-06**	**4.26E-06**	**5.77E-04**	**1.55E-04**	**1.53E-04**	**1.52E-04**	**1.54E-04**	**1.01E-05**

Table 7-8: Estimated Radiation Dose for Benthic Invertebrates during Post-Closure – Maximum Groundwater

Radionuclide	Unit	Benthic Invertebrate
Ac-225	mGy/d	1.55E-06
Ac-227	mGy/d	4.04E-09
Ag-108m	mGy/d	1.49E-06
Bi-210	mGy/d	4.22E-06
C-14	mGy/d	5.16E+00
Ca-41	mGy/d	6.29E-07
Cl-36	mGy/d	8.51E-08
Cs-137	mGy/d	5.73E-04
Gd-152	mGy/d	6.61E-13
HTO	mGy/d	3.80E-02
I-129	mGy/d	4.94E-06
Nb-94	mGy/d	4.96E-18
Ni-59	mGy/d	2.21E-05
Np-237	mGy/d	1.06E-03
OBT	mGy/d	7.10E-03
Pa-231	mGy/d	3.75E-08
Pa-233	mGy/d	9.26E-09
Pb-210	mGy/d	1.01E-07
Po-210	mGy/d	4.99E-01
Pu-239	mGy/d	4.11E-03
Pu-240	mGy/d	9.95E-06
Ra-223	mGy/d	3.04E-05
Ra-224	mGy/d	2.00E-10
Ra-225	mGy/d	4.28E-05
Ra-226	mGy/d	2.62E-05
Ra-228	mGy/d	1.58E-12
Tc-99	mGy/d	1.79E-06
Th-227	mGy/d	1.48E-07
Th-228	mGy/d	2.09E-11
Th-229	mGy/d	1.11E-07
Th-230	mGy/d	1.37E-07
Th-231	mGy/d	2.19E-08
Th-232	mGy/d	7.59E-13
Th-234	mGy/d	3.07E-06
U-233	mGy/d	1.06E-05
U-234	mGy/d	3.34E-05
U-235	mGy/d	1.27E-05
U-236	mGy/d	1.70E-05
U-238	mGy/d	8.07E-05
Total	**mGy/d**	**5.71E+00**

7.2.6.2 Non-Radiological Concentrations and Doses

As discussed in Section 7.1.3.2, the relevant COPCs for ecological health in the post-closure phase are cadmium, lead, HB-40, and xylene.

The exposure point concentrations for the ecological receptors identified are shown in Table 7-9 below. Ecological receptors do not reside in groundwater; however, they will be potentially exposed to COPCs where the groundwater seep mixes with the Winnipeg River. As such, ecological receptors near the source would be exposed to total surface water concentrations which have a Project contribution and a background contribution. As part of the routine monitoring at the WL site, water in the Winnipeg River at the WL intake is monitored for a variety of metals (CNL 2016c). The WL intake is located in the river at the WL site, upstream of any potential site-associated influence. It represents ambient water quality for the Winnipeg River exclusive of any potential WL site related influence.

As a conservative assessment, benthic invertebrates have also been modelled assuming that they reside in undiluted groundwater. In reality, a concentration gradient would exist across the sediment-water interface. The exposure point concentrations for benthic invertebrates exposed in a groundwater seep are shown in Table 7-9.

Non-radiological doses for birds and mammals are presented in Table 7-10.

Table 7-9: Exposure Point Concentrations for Non-Radiological COPCs for Ecological Receptors during Post-Closure

Non-radionuclide	Background Concentration (µg/L)	Groundwater Seep Concentration (µg/L)	Project Contribution to River Concentrations at Groundwater Seep at River Bottom (µg/L)	River Concentration at Groundwater Seep at River Bottom (µg/L)	Project Contribution to River Concentrations at Groundwater Seep - 50 m Downstream (µg/L)	River Concentration at Groundwater Seep - 50 m Downstream (µg/L)
Cadmium	1.00E-02	5.35E+00	3.59E-05	1.00E-02	4.15E-06	1.00E-02
HB-40	0.00E+00	5.84E+02	3.92E-03	3.92E-03	4.53E-04	4.53E-04
Lead	2.60E+00	7.27E+01	4.89E-04	2.60E+00	5.64E-05	2.60E+00
Xylene	NV	6.96E+01	4.18E-04	4.18E-04	4.83E-05	4.83E-05

Table 7-10: Exposure Doses for Non-Radiological COPCs for Birds and Mammals during Post-Closure

Non-radionuclide	Unit	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose*
Cadmium	mg/kg bw/day	1.07E-03	3.71E-04	1.97E-02	2.44E-02	4.97E-04	1.92E-04	1.82E-02
HB-40	mg/kg bw/day	1.07E+00	4.43E-01	2.72E-02	1.21E-01	5.09E-01	2.61E-01	2.50E-02
Lead	mg/kg bw/day	7.76E-02	2.42E-02	5.13E-01	6.38E-01	2.86E-02	1.14E-02	4.72E-01
Xylene	mg/kg bw/day	1.94E-04	6.79E-05	1.15E-05	3.00E-05	9.19E-05	3.56E-05	1.06E-05

Note:
* As a conservative assumption, the moose was assumed to consume only aquatic plants to maximize exposure to surface water.

7.2.7 Uncertainties in Exposure Assessment

Uncertainties in the exposure assessment include the representativeness of the predicted concentrations used in the assessment at each location.

Exposure concentrations used in the assessment for each radionuclide represent its time of peak discharge. Total doses calculated across radionuclides assume that the peaks are concurrent, which is conservative. All organisms were assumed to spend all of their time at the exposure location, which is conservative for mobile birds and mammals on-site, as they are likely to spend time offsite at lower exposure concentrations.

Exposure factors were based on best-available information from literature with preference for exposure factors identified in CSA N288.1-14 (2014). For elements that did not have exposure factors in CSA (2014), surrogate elements were identified based on proximity in the periodic table, as shown in Table 5-6. This is considered appropriate.

Since the exposure assessment is predictive, BAFs were used to calculate uptake into tissues. BAFs are not species specific, e.g., the same BAFs are used for Lake Sturgeon and Walleye. Additionally, the BAFs used for the exposure assessment were not site-specific; they were taken from reputable sources (e.g., N288.1-14) and are considered to be representative of the conditions found at the site.

Wildlife exposure factors, such as intake rates and diets, are a potential source of uncertainty. Reputable sources are used for these factors and are considered to be representative of the organisms assessed.

Dose coefficients were obtained from reputable sources for reference organisms, but have not been derived specifically for all the organisms assessed. Dose coefficients for surrogate organisms were often used. They were selected with attention to similar body size and exposure habits, and are believed to adequately represent the organism assessed. Dose coefficients for each receptor were not adjusted for body size and dimensions

The IMPACT^{TM} model was used to predict dose to identified ecological receptors during the post-closure phase. The IMPACT^{TM} model used is a steady state model; however, it includes time dependent equations to account for buildup in soil from irrigation, for all radionuclides released.

In the post-closure phase, C-14 is conservatively assumed to be released from groundwater to the Winnipeg River in a dissolved carbonate form, instead of a gaseous form. The transfer of soluble C-14 to the terrestrial environment is through use of river water for irrigation or livestock watering. The stable carbon contents for aquatic biota and terrestrial biota used in the assessment are similar, consistent with CSA N288.1-14. Therefore, exposure of terrestrial and aquatic biota to C-14 taken up from river water, is similar. The assumption that C-14 is in a soluble form, rather than a gaseous form, is conservative.

7.3 Effects Assessment

7.3.1 Toxicological Benchmarks

Aquatic toxicity benchmarks for fish, aquatic plants and benthic invertebrates are summarized in Table 7-11 to Table 7-13 and are based on concentration. The benchmarks were obtained from Suter and Tsao (1996), Nagpal (2007), and EcoMetrix (2017). In cases where a chronic benchmark was not found and an acute benchmark was available, the acute benchmark was converted to a chronic benchmark by dividing by a factor of 10.

The bird and mammal toxicity benchmarks used are summarized in Table 7-14 and Table 7-15, respectively.

The benchmark values for birds and mammals are based on doses. The benchmark doses used were generally the LOAEL values from Sample *et al.* (1996) for birds and mammals. The TRV for xylene for birds is a NOAEL from Hill and Camardese (1986) because a LOAEL was not available. The TRV for xylene for mammals was from NTP (1986). For HB-40, the mammalian TRV was from Adamson and Weeks (1973); however, there were no data available for the toxicity of HB-40 for birds.

Table 7-11: Selected Toxicity Reference Values for Fish

Non-radionuclide	TRV mg/L	Test Species	Endpoint	Reference
Cadmium	1.70E-03	Brook Trout (*Salvelinus fontinalis)*	LCV (Early life stage)	Sauter *et al*. 1976 (cited in Suter and Tsao 1996)
HB-40	8.60E-01	Fathead minnow	IC25 (Growth-7 day)	Aquatox 2017 (cited in EcoMetrix 2017)
Lead	1.89E-02	Rainbow Trout	LCV (Early life stage)	Davis *et al.* 1976 (cited in Suter and Tsao 1996)
Xylene	2.68E+00	Rainbow Trout (embryo life-stage)	EC20	Black and Birge 1982 (cited in Suter and Tsao 1996) (m-xylene)

Table 7-12: Selected Toxicity Reference Values for Aquatic Plants

Non-radionuclide	TRV mg/L	Test Species	Endpoint	Reference
Cadmium	2.00E-03	*Asterionella formosa*	LCV (Growth)	Conway 1977 (cited in Suter and Tsao 1996)
HB-40	4.70E-01	*P. subcapitata*	IC25 (Growth-72 h)	Aquatox 2017 (cited in EcoMetrix 2017)
Lead	5.00E-01	*Chlorella vulgaris, Scenedesmus quadricauda, Selenastrum capricornutum*	LCV (Growth)	EPA 1985 (cited in Suter and Tsao 1996)
Xylene	3.90E+00	*Selenastrum capricornutum*	LC50 (8-day)	Herman *et al*. 1990 (cited in Nagpal 2007)

Table 7-13: Selected Toxicity Reference Values for Benthic Invertebrates

Non-radionuclide	TRV mg/L	Test Species	Endpoint	Reference
Cadmium	1.50E-04	*Daphnia magna*	LCV (Reproduction)	Chapman *et al.* n.d. (cited in Suter and Tsao 1996)
HB-40	2.00E-02	*C. dubia*	IC25 (Reproduction- 6 day)	Aquatox 2017 (cited in EcoMetrix 2017)
Lead	1.23E-02	*Daphnia magna*	LCV	Chapman *et al.* n.d. (cited in Suter and Tsao 1996)
Xylene	1.00E-01	*Daphnia magna*	IC50 (24-h)	Applied an uncertainty value of 10 for acute to chronic; Galassi *et al*. 1988 (cited in Nagpal 2007)

Table 7-14: Selected Toxicity Reference Values for Birds

Non-radionuclide	TRV mg/kg bw/day	Type	Test Species	Endpoint	Test Duration	Reference
Cadmium	2.00E+01	LOAEL	Mallard Ducks	Reproduction	90 days	White and Finley 1978 (cited in Sample *et al.* 1996)
HB-40	NV	NV	NV	NV	NV	NV
Lead	1.13E+01	LOAEL	Japanese Quail	Reproduction	12 weeks	Edens *et al.* 1976 (cited in Sample *et al.* 1996)
Xylene	5.59E+01	NOAEL	Japanese Quail	Mortality and overt signs of toxicity	5 day	Applied an uncertainty value of 10 for acute to chronic; Hill and Camardese 1986; weight of animal taken from Hassein et al 2013

Table 7-15: Selected Toxicity Reference Values for Mammals

Non-radionuclide	TRV mg/kg bw/day	Type	Test Species	Endpoint	Test Duration	Reference
Cadmium	1.00E+01	LOAEL	Rat	Reproduction	6 weeks through mating and gestation	Sutou *et al*. 1980 (cited in Sample *et al*. 1996)
HB-40	2.50E+02	LOAEL	Mouse	Proliferation of smooth ER in hepatocytes	16 weeks	Adamson and Weeks 1973 (cited in Weeks 1974)
Lead	8.00E+01	LOAEL	Rat	Reproduction	3 generations	Azar *et al.* 1973 (cited in Sample *et al.* 1996)
Xylene	3.57E+02	LOAEL	Rat	Growth and Survival	103 weeks	NTP 1986 (as cited in US Department of Health and Human Services 1986) and used by the MOE 2011

7.3.2 Radiation Benchmarks

The radiation dose benchmarks for this assessment are 0.4 mGy/h (9.6 mGy/d) for aquatic biota and 0.1 mGy/h (2.4 mGy/d) for terrestrial biota, based on UNSCEAR (2008) and consistent with CSA N288.6-12 (CSA 2012). More detail on these benchmarks is provided in Section 6.3.2.

7.3.3 Uncertainties in the Effects Assessment

Toxicological benchmarks used in the risk assessment were selected from sources recommended in the CSA N288.6-12 (CSA 2012) standard, and other reputable sources. These BVs represent the low end of threshold effect levels in literature for each receptor category. BVs for the test species were not adjusted for body weight and were considered directly applicable to the wildlife species. The BVs are considered to be conservatively representative of the effect threshold for the COPC for the receptor of interest. There is uncertainty because most species of interest have not been tested to determine their effect thresholds. Nevertheless, it is expected that few species will be much more sensitive than indicated by the selected benchmark values.

Also, toxicological benchmarks are not available for certain COPCs (e.g., HB-40 for birds), therefore no quantitative assessment was carried out.

Radiation dose benchmarks for biota are a topic of ongoing debate. Uncertainties exist related to some low values that have been suggested based on field studies around Chernobyl. The radiation dose benchmarks chosen follow UNSCEAR (2008) and CSA N288.6-12 (CSA 2012) in giving more credence to values based on controlled laboratory studies and demonstrated low levels of effect.

7.4 Risk Characterization

7.4.1 Risk Estimation for Radiological COPCs

The total doses are compared to dose benchmarks of 9.6 mGy/d for aquatic biota and 2.4 mGy/d for terrestrial and riparian biota. A summary of the total dose for each ecological receptor is provided in Table 7-16 along with a comparison to their respective dose benchmarks. A summary of the total dose for the scenario where benthic invertebrates are exposed to maximum groundwater concentrations is provided in Table 7-17 along with a comparison to the aquatic dose benchmark.

For ecological receptors exposed to sediment (Lake Sturgeon, Carmine Shiner, Benthic Invertebrates, Horned Grebe, Trumpeter Swan, Wild Waterfowl and Mink) the dose is primarily due to existing Cs-137 in the river sediment, with C-14 from the Project being the next largest contributor to dose. For the remaining ecological receptors, the dominant pathway of exposure is C-14 from the Project through the food chain.

Table 7-16: Summary of Total Dose for Post-Closure Ecological Receptors and Comparison to Dose Benchmarks

Ecological Receptor	Total (including background Cs-137) (mGy/day)	Project only* (mGy/day)
Barn Swallow	8.13E-06	8.13E-06
Little Brown Bat	6.58E-06	6.58E-06
Carmine Shiner	1.14E-04	4.10E-06
Lake Sturgeon	1.14E-04	4.10E-06
Walleye	4.10E-06	4.10E-06
Freshwater plant	4.26E-06	4.26E-06
Benthic Invertebrate	5.77E-04	4.00E-06
Horned Grebe	1.55E-04	8.05E-06
Trumpeter Swan	1.53E-04	8.07E-06
Wild Waterfowl	1.52E-04	8.05E-06
Mink	1.54E-04	6.59E-06
Moose	1.01E-05	6.95E-06

Notes:
Bold and shaded cells indicate exceedance of the aquatic benchmark of 9.6 mGy/d or the terrestrial benchmark of 2.4 mGy/d
*Project dose results exclude the existing background contribution from Cs-137 present in sediment.

Table 7-17: Summary of Total Dose for Post-Closure Benthic Invertebrates Exposed to Groundwater and Comparison to Dose Benchmarks

Ecological Receptor	Dose (mGy/d)
Benthic Invertebrate (Groundwater)	5.71E+00

Notes:
Bold and shaded cells indicate exceedance of the aquatic benchmark of 9.6 mGy/d

7.4.2 Risk Estimation for Non-Radiological COPCs

Ecological risk is estimated by dividing the EV (Section 7.2.6) by the BV (Section 7.3.1) for a given COPC and receptor species, yielding a HQ. When the EV for an organism at a site exceeds the BV (HQ > 1), a potential for adverse ecological effects is inferred.

The HQs for non-radiological COPCs for aquatic receptors are presented in Table 7-18 and Table 7-19. The HQs are presented for benthic invertebrates exposed to groundwater after it is mixed with the river, and also for benthic invertebrates exposed directly to groundwater prior to mixing with the river.

The HQs for mammals and birds are presented in Table 7-20.

Table 7-18: Non-Radiological Hazard Quotients for Aquatic Receptors

Non-radionuclide	Benthic Invertebrates	Fish	Aquatic Plants
	unitless	unitless	unitless
Cadmium	6.69E-02	5.90E-03	5.02E-03
HB-40	1.96E-04	4.56E-06	8.35E-06
Lead	2.12E-01	1.38E-01	5.20E-03
Xylene	4.18E-06	1.56E-07	1.07E-07

Notes:
Bold and shaded values indicate a HQ > 1

Table 7-19: Non-Radiological Hazard Quotients for Benthic Invertebrates Exposed to Groundwater

Non-radionuclide	Benthic Invertebrates (Groundwater)
	unitless
Cadmium	**3.57E+01**
HB-40	**2.92E+01**
Lead	**5.93E+00**
Xylene	6.96E-01

Notes:
Bold and shaded values indicate a HQ > 1

Table 7-20: Non-Radiological Hazard Quotients for Birds and Mammals

Non-radionuclide	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose
	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Cadmium	5.36E-05	1.85E-05	9.87E-04	1.22E-03	4.97E-05	1.92E-05	1.82E-03
HB-40	NV	NV	NV	NV	2.04E-03	1.04E-03	1.00E-04
Lead	6.87E-03	2.15E-03	4.54E-02	5.65E-02	3.58E-04	1.42E-04	5.90E-03
Xylene	3.46E-06	1.21E-06	2.06E-07	5.37E-07	2.57E-07	9.96E-08	2.98E-08

Notes:
Bold and shaded values indicate a HQ > 1
NV = no value available to calculate HQ.

7.4.3 Discussion of Chemical and Radiation Effects

7.4.3.1 Likelihood of Radiological Effects

There are no exceedances of the 9.6 mGy/d radiation benchmark for the aquatic biota in the Winnipeg River. Similarly, there are no exceedances of the 2.4 mGy/d radiation benchmark for terrestrial and riparian biota on or near the WL site. All predicted doses are well below these levels. Therefore, it is unlikely that there would be significant adverse effects on either aquatic or terrestrial populations or communities as a result of radionuclide releases from post-closure activities.

While Table 7-16 and Table 7-17 present the results based on the conservative assumption that maximum loadings to the river occur at the same time for all COPCs, Figure 7-4 and Figure 7-5 show a more realistic representation of predicted dose rate to ecological receptors over the post-closure phase.

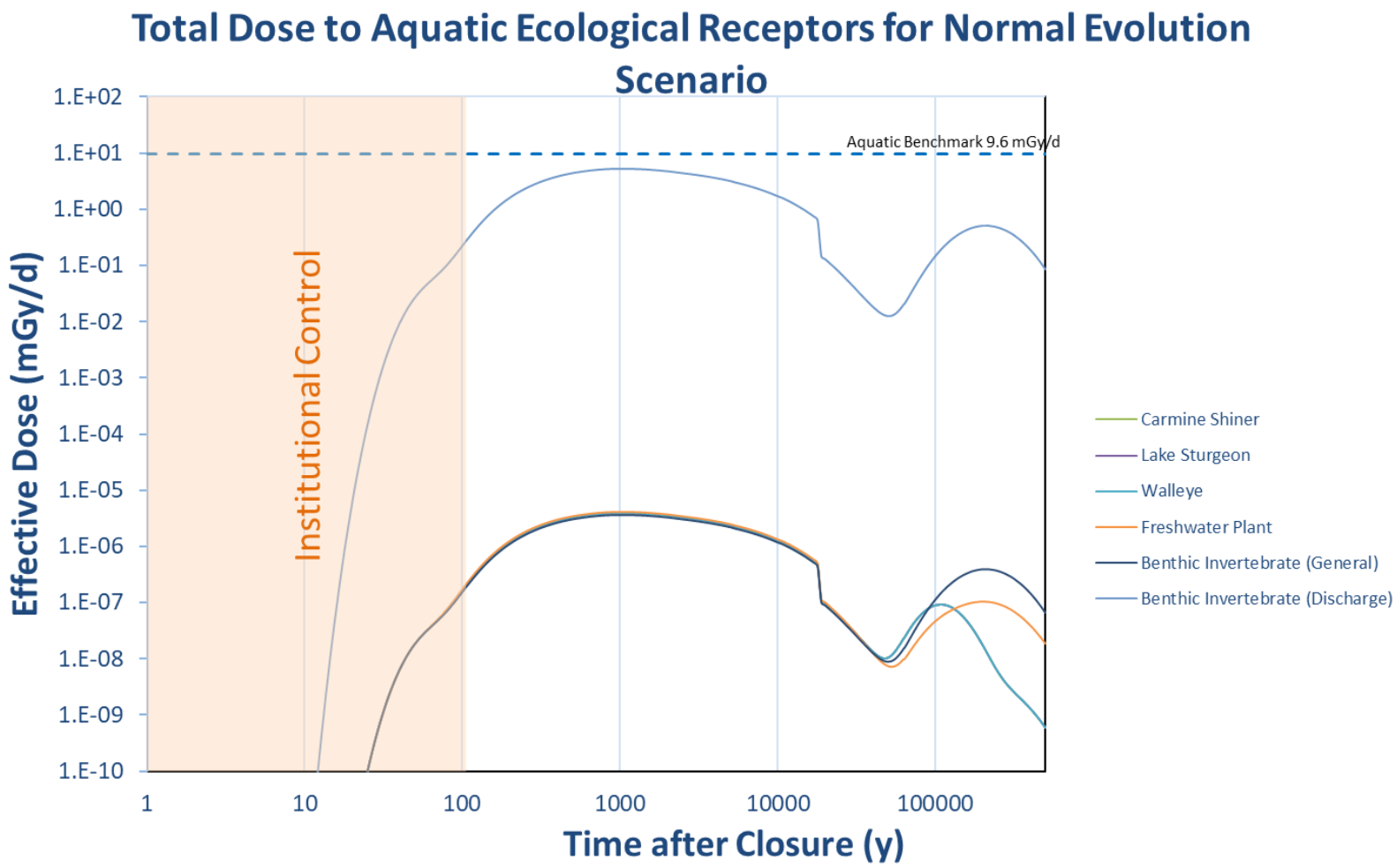

Figure 7-4: Dose Rate to Aquatic Ecological Receptors for Post-Closure

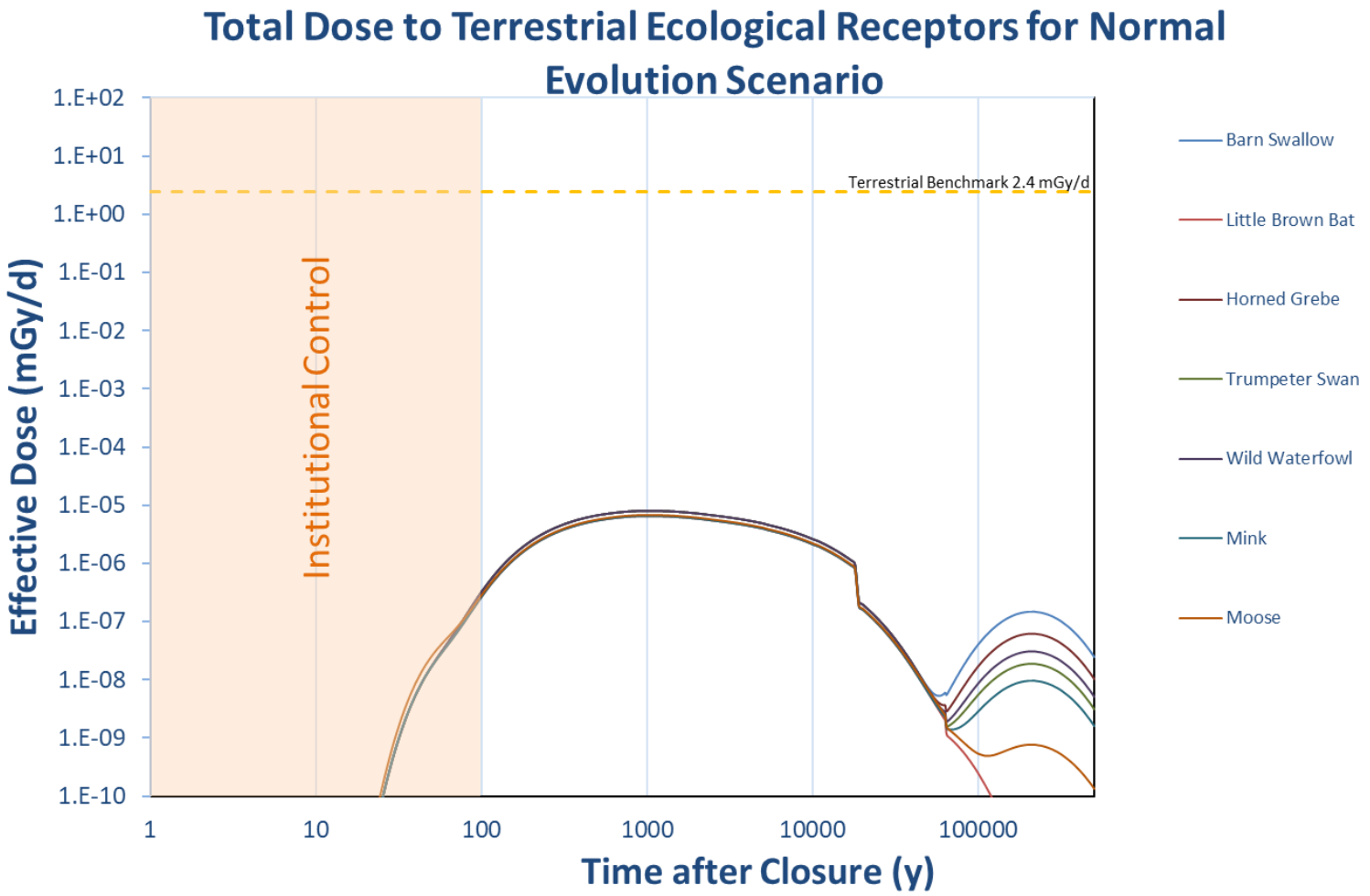

Figure 7-5: Dose Rate to Riparian and Terrestrial Ecological Receptors for Post-Closure

7.4.3.2 Likelihood of Non-Radiological Effects

There are no exceedances of the HQs identified for exposure of the ecological receptors to cadmium, lead, HB-40 and xylene. Therefore, it is unlikely that there would be significant adverse effects on either aquatic or terrestrial populations or communities as a result of these chemical releases.

The HQs for cadmium, lead and HB-40 exceeded 1 for the scenario where benthic invertebrates are exposed directly to groundwater. The assumption of direct exposure to undiluted groundwater is conservative, because a diffusion gradient will exist across the sediment-water interface, resulting in some degree of dilution into the top layer of sediment where most benthic organisms reside. Moreover, the seepage area represents a small part of the benthic community habitat, and the maximum groundwater concentration assumed represents the worst case time period. As such, benthic invertebrates may not be at risk due to cadmium, lead and HB-40 exposure, and any adverse effects will be spatially and temporally limited.

There were no data to determine HB-40 benchmarks for birds. As such there is uncertainty around the potential health risks to birds due to HB-40 exposure. Nevertheless, considering that the major constituent of HB-40 (e.g., hydrogenated terphenyl) is closely related to the aromatic hydrocarbon group and that petroleum hydrocarbons are metabolized by vertebrates (CCME 2008), it can be suggested that exposure of birds to HB-40 is likely to be limited because HB-40 will be readily metabolized by birds and therefore is not anticipated to accumulate. In addition, assuming that birds are similar to mammals in terms of HB-40 toxicity, if the HB-40 TRV for mammals is used for birds, all bird doses are far below the TRV.

7.4.4 Uncertainties in the Risk Characterization

There are uncertainties associated with the components contributing to the overall risk assessment. These includes receptor exposure factors, such as transfer factors, intake rates and bioaccumulation factors, and dose coefficients (discussed in Section 7.2.7), as well as benchmark values used to determine risk of potential effects (discussed in Section 7.3.3).

Overall, considering uncertainties in the exposure assessments and the benchmark values, it is reasonable to consider that if HQs are above 1 for a COPC, receptor and location, they are indicative of a potential for adverse effects. However, this does not necessarily imply adverse effects. In some cases, field studies may be appropriate to clarify whether effects are occurring; however, in this case, with the exception of benthic invertebrates at the site, all predicted HQs are well below 1, supporting a conclusion of no adverse effect.

Five radionuclides (Nb-94, Ra-224, Ra-228, Th-228, and Th-232) and eight non-radionuclides (barium, chromium, copper, mercury, nickel, lead, samarium, and zirconium) did not achieve maximum loadings before 500,000 years (Table 5-24). The groundwater flow and solute transport model was run again without the 500,000 year constraint to

determine the peak mass loadings, which is reflected in the source-term used in the ERA. Some of these radionuclides and non-radionuclides do not reach peak mass loadings until well past 500,000 years. For example, lead reaches peak mass loadings after 5,596,000 years, which adds conservatism to the assessment.

The radiological parameters have peak loadings and the higher values do not affect the conclusions in this risk assessment. The non-radiological parameters had loadings that increased more substantially, but the peak groundwater concentrations were all below the screening criteria, except for lead. With respect to lead, the Project contribution from lead is very small (i.e., orders of magnitude less than background levels in the river); therefore, using the higher peak would still result in a river concentration effectively at or below the background concentration. The benthic invertebrates exposed to 100% groundwater would still have HQs greater than 1, as was assessed in the ERA. Therefore, there is no additional risk to what has been presented in this assessment based on greater than 500,000 year runs.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

8.1.1 Closure Phase

Human Health

- The total radiation dose to all human receptors during closure activities (demolition prior to grouting and grouting) is well below the public dose limit of 1 mSv/a and dose constraint for the Project of 0.25 mSv/a for both maximum and average release rates.

Ecological Health

- There are no exceedances of the 2.4 mGy/d radiation benchmark for terrestrial and riparian biota on or near the WL site for both maximum and average release rates.

8.1.2 Post-Closure Phase

Human Health

- For the On-Site Farm and Farm A residents and the Harvester, the total radiation dose during the post-closure phase is well below the public dose limit of 1 mSv/a, and the dose constraint for the Project of 0.25 mSv/a for maximum release rates.

- The HQs for the Harvester are below the acceptable risk level of 0.2 for all pathways for cadmium and lead.

- The HQs for the On-Site Farm and Farm A are below the acceptable risk level of 0.2 for cadmium and lead for all pathways, with the exception of lead from drinking water from the Winnipeg River. This exceedance is from background concentrations of lead in the Winnipeg River and not related to releases from the WRDF.

Ecological Health

- There are no exceedances of the 9.6 mGy/d radiation benchmark for the aquatic biota in the Winnipeg River for maximum releases. Similarly, there are no exceedances of the 2.4 mGy/d radiation benchmark for terrestrial and riparian biota on or near the WL site for maximum releases.

- The HQs for benthic invertebrates due to direct exposure to maximum concentrations of cadmium, lead and HB-40 in groundwater were above the target level of 1; however, these concentrations are a conservative representation of

exposure, and would be spatially and temporally limited, such that the community as a whole is not expected to be significantly affected.

- The HQs for all ecological receptors due to exposure to cadmium, lead, HB-40 and xylene in groundwater after it is mixed with the Winnipeg River, were below the target value of 1. Therefore, it is unlikely that there would be significant adverse effects on either aquatic or terrestrial populations or communities as a result of these maximum chemical releases.

8.1.3 Cumulative Effects with WL Site

The WR-1 is located on the WL site which is comprised of other buildings and facilities that are currently undergoing various decommissioning activities according to the overall decommissioning plan for the WL site. The WL site has been divided into four post-closure land-use categories: agricultural, residential, industrial and recreational, and associated clearance levels and cleanup criteria for radionuclides and non-radionuclides have been developed. Each facility will be decommissioned and remediated to meet the cleanup criteria for the designated future land-use (CNL, 2019b), which are protective of the anticipated future receptors and pathways on those lands.

Since risks to human and ecological receptors from radionuclides and non-radionuclides anticipated to be released during the closure and post-closure phases of the WR-1 Project are considered acceptable, cumulative effects from the WL site are not anticipated.

Additionally, a site-wide ERA is currently underway to assess the impacts of current operations and decommissioning activities at the WL site in terms of dose and risk to human and ecological receptors. Results of this site-wide ERA can be used to provide additional context to the cumulative effects of the WL site and the WR-1 Project.

The site-wide ERA, and any subsequent assessments to support execution of decommissioning or disposal work at WL, that may not yet be completed, are subject to the same regulatory requirements as the WR-1 ISD project, in that total cumulative risk to the public must meet the regulatory limits (CNSC, 2021). Each subsequent assessment must also consider the impact of cumulative effects and set appropriate constraints to account for those effects. The WR-1 ISD project is estimated to contribute <0.1% of the total acceptable dose to the public. It is expected that other acceptable projects in the future would meet at least the same benchmark, and also not contribute significantly to a cumulative impact in excess of any regulatory limit.

8.2 Recommendations for the Follow-Up Monitoring Program

In consideration of the ERA results, decommissioning of the WR-1 Building is not expected to adversely affect any receptors during the post-closure phase. As part of CNL's licence with the CNSC, environmental monitoring around the WL site is required. The current program includes collecting water, sediment, and fish tissues (CNL 2016e).

The future monitoring program should be designed to confirm ERA predictions, to the extent possible. This confirmation should occur within the period of institutional control, so that appropriate actions can be taken if results are not as predicted. Radionuclides and non-radionuclides to be monitored in future should be detectable within 100 years of WR-1 decommissioning, based on predictions. Candidates for monitoring therefore include tritium, C-14, cadmium, HB-40 and xylenes. Lead is not expected to be detectable during the 100 years of institutional control; therefore, there will be little benefit in monitoring for lead.

Follow-up monitoring that continues during institutional control should include groundwater sampling and analysis to confirm predicted groundwater concentrations near the point of discharge to the Winnipeg River. Sediment and/or benthic community monitoring may be appropriate at this point, and upstream and downstream. Upstream and downstream samples of surface water and fish in the river might also be taken to confirm that there are no measurable upstream-downstream differences, as expected. Changes to surface water quality from the Project are predicted to be negligible and will likely not be detectable in the river or in biota.

8.3 Risk Management Recommendations

No risk management recommendations are made at this time.

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Appendix A Ecological Receptor Profiles

One of the key considerations, which defines the scope of a risk assessment, is the selection of ecological receptors. In selecting ecological receptors it is important to identify plants and animals that are likely to be most exposed to the effects of the Project. As it is not possible to evaluate all ecological species at a site, representative Valued Components (VCs) are generally selected based on several criteria as discussed in the main ERA report.

Species at Risk (SAR) were considered as part of the VC selection. Species at Risk can be difficult to include in dose and risk calculations due to incomplete knowledge of their exposure factors. While not all SAR will be specifically assessed, an effort was made to ensure that the selected VCs include species with similar feeding habits, so that surrogate species from the VC list can be used to infer dose and risk for the SAR species either present or potentially present on-site.

This appendix details the aquatic and terrestrial ecological receptors (groups or species) selected for the assessment.

A.1 Terrestrial Biota

A.1.1 Soil Invertebrates

A.1.2 Earthworms

Earthworms live in soil, and depending on the species they either move vertically or horizontally in different soil layers. Earthworms acquire their nutrition through the organic matter in soil as well as the decomposing remains of other animals. They can devour one third of their own body weight per day. For the ecological model the earthworm is a food source for the American Robin, Loggerhead Shrike, common (masked) shrew, red fox,

A.1.3 Terrestrial Plants

A.1.3.1 Grass and Shrubs (Forage)

For the ecological model, grasses and shrubs were used as a food source for the meadow vole, deer, rabbit, and red fox.

Shrubs (forage) will be used as a surrogate for terrestrial plant SARs, as per SARA, COSEWIC or ESEA, that may be potentially on or within the vicinity of the Study Area: Gattinger's Agalinis (*Agalinis gattingeri*), Rough Agalinis (*Agalinis aspera*), Western Silvery Aster (*Symphyotrichum sericeum*), and Ironweed (*Vernonia fasciculate*).

A.1.3.2 Fruit (Berries)

For the ecological model, fruits represented by berries, are used as a food source for the American Robin, meadow vole, deer, rabbit, red fox, and little brown myotis.

A.1.4 Terrestrial Birds

A.1.4.1 American Robin

The American Robin (*Turdus migratorius*) is a migratory thrush that may breed and over winter in Canada (FCSAP 2012). During the breeding season, the American Robin is found across the continental United States and Canada (U.S. EPA 1993). The average breeding male weight is 77.4 g and the average breeding female weight is 80.6 g (Wheelright 1986 as cited in U.S. EPA 1993). American Robins make use of a wide variety of habitats with open areas.

American Robins typically nest in trees, but may also nest in gutters, eaves, external light fixtures and structures (Sallabanks and James 1999). Females lay a clutch of three to five eggs. Eggs hatch within 12 to 14 days and the nestling period lasts approximately 13 days (Sallabanks and James 1999).

The American Robin forages on the ground for invertebrates and in shrubs and low tree branches for fruit and foliage-dwelling insects (U.S. EPA 1993). Earthworms and insects account for most (71%) of the nestlings and fledglings diet with the reminder of the diet consisting of vegetation, seeds and fruit (29%). Before and during the breeding season, robins predominately feed on invertebrates (between 80 to 90% volume), with fruits making up the bulk of the robin's diet for the reminder of the year (between 60 to 90% volume) (Wheelright 1986 as cited in U.S. EPA 1993).

The mean territory size of the American Robin ranges between 0.11 and 0.42 hectares in the spring with a mean foraging home range between 0.15 and 0.81 in the summer (U.S. EPA 1993).

For the ecological model it is assumed that the American Robin's diet consists of 60% fruits represented by berries (60%) and soil invertebrates represented by earthworms (40%), (FCSAP 2012).

The American Robin is a surrogate for following Species at Risk (SAR), as per SARA, COSEWIC or ESEA, that may be potentially in or near the Study Area: Bobolink (*Dolichonyx oryzivorus*) and Red-headed Woodpecker (*Melanerpes erythrocephalus*)

A.1.4.2 Prairie Loggerhead Shrike

The Loggerhead Shrike *(Lanius ludovicianus excubitorides)* is a medium-sized song bird that weighs between 35 and 50g and exhibits a raptor type predatory behaviour (Yosef

1996). In Canada the prairie Loggerhead Shrike is found in southwestern Alberta, southern Saskatchewan and southern Manitoba (COSEWIC 2014).

The Loggerhead Shrike habitat is characterized by open areas such as grasslands, pastures, prairie, and agricultural lands with scattered shrubs and trees. These birds are often seen perching on fence lines and posts, utility wires, and dead branches of trees and shrubs (Yosef 1996; ECCC & CWF 2005; COSEWIC 2014).

The Loggerhead Shrike breeds in Canada between late March and early May and over winters in the southern United States (ECCC & CWF 2005; COSEWIC 2014). The Loggerhead Shrike typically nests in thorny vegetation, but may also nest in brush piles and dense cover above the ground (Yosef 1996; ECCC & CWF 2005). Females lay a clutch of five to six eggs (Yosef 1996; COSEWIC 2014). The eggs hatch within 15 to 18 days and the nestling period lasts approximately 13 to 20 days (Yosef 1996; COSEWIC 2014).

The Loggerhead Shrike is an aerial diver that eats invertebrates, amphibians, reptiles, small mammals, and birds. In the breeding season the Loggerhead Shrike predominately eats invertebrates. In the winter the Loggerhead Shrike relies on a vertebrate diet. These birds typically impale their prey on the thorns of small trees and wired fences when eating. This impalement of prey may also be used as a food storage system or to mark the bird's territory (Yosef 1996).

The mean territory sizes of these birds in two Alberta studies were found to be between 8.5 and 13.4 hectares (COSEWIC 2014).

For the ecological model it is assumed that the Loggerhead Shrike's diet consists of invertebrates represented by the earthworm (80%); small birds represented by the American Robin (10%), and small mammals represented by the meadow vole (10%).

The prairie Loggerhead Shrike is designated as "threatened" under COSEWIC and "endangered" under SARA and the Manitoba ESEA. The Loggerhead Shrike was last observed on-site in 2014.

The Loggerhead Shrike will also be used as a surrogate for the Short Eared Owl (*Asio flammeus)*, a species designated as "special concern" under COSEWIC and SARA, and "threatened" under the Manitoba ESEA.

A.1.4.3 Barn Swallow

The Barn Swallow (*Hirundo rustica*) is a songbird that is found in every continent except Antarctica (COSEWIC 2011). The Barn Swallow is also the most common species of swallows in the World. The average male weight is 18.1 g and the average female weight is 19.2 g (Brown and Brown 1999). The general habitat of the Barn Swallow is open areas

such as grasslands, pastures and farmyards, agricultural lands, and the shoreline of lakes and rivers (COSEWIC 2011).

The Barn Swallow breeds across North America and winters in Central and South America. Nests are built on and in man-made structures such as barns, bridges and culverts. In southern Canada, females start to lay eggs in mid- May (COSEWIC 2011).

Females lay a clutch of three to seven eggs. Eggs hatch within 12 to 17 days and the nestling period lasts between 15 to 27 days. Young are tended by parents and sometimes help from other Barn Swallows. Two broods may be raised in a single year (Brown and Brown 1999; COSEWIC 2011).

The Barn Swallow is an aerial forager. The diet of the Barn Swallow is flying insects. Many of these insects have an aquatic life stage (FCSAP 2012). During breeding season the foraging home range is between 0.8 and 4.5 km^2 (FCSAP 2012; Brown and Brown 1999).

For the ecological model it is assumed that the Barn Swallow's diet consists of insects represented by benthic invertebrates (100%).

The Barn Swallow is designated as "threatened" under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). It is not listed as a Species at Risk (SAR) under the federal Species at Risk Act (SARA) and the Manitoba Endangered Species and Ecosystem Act (ESEA).

The Barn Swallow is a surrogate for following Species at Risk, as per SARA, COSEWIC or ESEA, that may be potentially in or near the Study Area: Bank Swallow (*Riparia riparia*), Canada Warbler (*Wilsonia Canadensis*), Chimney Swift (*Chaetura Pelagica*), Common Nighthawk (*Chordeiles minor*), Eastern Wood pewee (*Contopus virens*), Golden-winged Warbler (*Vermivora chrysoptera*), Olive-sided Flycatcher (*Contopus cooperi*), Piping Plover (*Charadrius melodus*), Whip-poor-will (*Antrostomus vociferous*), and Yellow Rail (*Coturnicops noveboracensis*).

A.1.5 Terrestrial Mammals

A.1.5.1 Meadow Vole

The meadow vole (*Microtus pennsylvanicus*) is a small herbivorous rodent, measuring 8.9 to 13 cm from head to tail, and weighing between 0.02 to 0.04 kg. The meadow vole is found across Canada, Alaska and the northern United States. They can be found mainly in meadows, lowland fields, grassy marshes, and along rivers and lakes. They are also occasionally found in flooded marshes, high grasslands near water, and orchards or open woodland if grassy. The meadow vole has a small home range size with a mean home range between 0.0069 and 0.083 hectares in the summer (U.S. EPA 1993).

The meadow vole breeds throughout the year, but breeding peaks from April to October. Gestation lasts approximately 21 days, with litter sizes ranging from 1 to 9 (NatureServe 2012).

Meadow voles mainly feed on shoots, grass, and bark (U.S. EPA 1993). For the ecological model it is assumed that the meadow vole's diet consists of grass (100%).

A.1.5.2 Common (Masked) Shrew

The common (masked) shrew (*Sorex cinereus*) is the most widespread and adaptable of the North American shrews with reproductive age Canadian shrews measuring 7.5 to 12.5 cm in total length, and weighing on average between 0.0036 and 0.0046 kg. Although the common shrew may occupy a wide variety of habitats they are most abundant in damp and mossy woodlands. Shrews build hollow nests of grass and leaves in stumps, logs, debris or burrows, and forage under leaf litter in tunnels or runways created by other animals (Naughton 2012).

The common shrew is an insectivore that eats a variety of invertebrates. During the winter, the diet of the shrew consists mostly of dormant insects and pupae with truffles and seeds being consumed when food is limited. Shrews may also eat carrion, salamanders and bird eggs. Shrews are prey for hawks and owls, herons, shrikes, snakes as well as several carnivorous mammals such as weasels, foxes, and larger shrews (Naughton 2012). The average foraging range size of the shrew is 0.6 hectares (Nagorsen 1996 as cited in FSCAP 2012).

Shrews typically breed between May and September, with most females producing one to three litters annually and an average litter size of five to seven. The gestation period of the common shrew is not known. Young shrews leave the nest after approximately 27 days (Naughton 2012).

For the ecological model it is assumed that the diet of the common shrew consists of invertebrates represented by the earthworm (100%).

A.1.5.3 Snowshoe Hare

The snowshoe hare (*Lepus americanus)* is a medium sized hare that is common and widespread throughout Canada. A mature hare measures a total length between of 38 to 67 cm and weighs between 0.9 to 2.3 kg. Adult females are typically 10 to 40% larger than males (Naughton 2012).

The snowshoe hare is an herbivore that dwells in dense forest brush. Hares thrive in successional forests that have undergone logging, fires or wide-scale changes. The summer diet of snowshoe hares consists of herbaceous vegetation such as horsetails, while the winter diet consists of buds, twigs, bark, and evergreen leaves of woody plants, and the occasional remains of deer and other hare (Banfield 1974; Naughton 2012).

The home range size of the hare can vary between 1.5 to more than 12 hectares (Naughton 2012).

The snowshoe hare breeding season is dependent on the day length and geography. Female hares in the south typically start their first oestrus of the year in late March, while female hares in the north typically start their first oestrus of the year in late May. Gestation lasts between 35 and 40 days, with females producing an average litter size of two to five. In north, female hares may produce two to three litters per year. In the south, female hares may produce four litters. Young are typically weaned at approximately 28 days old (Naughton 2012).

For the ecological model it is assumed that the snowshoe hare consumes 100% terrestrial vegetation represented by grass. The weight of 1.8 kg for the rabbit reported in the CSA (2014) was used in the ecological model for the snowshoe hare.

A.1.5.4 White-tailed Deer

The white-tailed deer (*Odocoileus virginianus*) is the smallest of the native Canadian deer, measuring 151 to 240 cm in total length, and weighing between 50 to 135 kg (adult). Males are typically 20 to 55% larger than females (Naughton 2012).

The white-tailed deer is widespread throughout North America. They prefer open forests intermixed with "*meadows, clearings, grasslands, and riparian flatlands"*. The white-tailed deer home range size ranges between 60 to 500 hectares (Naughton 2012).

The white-tailed deer diet consists mainly of terrestrial vegetation such as fresh grasses, forbs, fruits, nuts, browse, as well as mushrooms. If a female white-tailed deer is well nourished, it breeds yearly. Mating season for Canadian deer typically take place between late October and mid-December, with a breeding peak in mid-November. Gestation lasts approximately 200 days with first time mothers typically producing one off-spring and repeat, larger, well-nourished mothers producing two or three off-springs. Fawns are fully weaned by four months (Naughton 2012).

For the ecological model it is assumed that the diet of the white-tailed deer consists of terrestrial vegetation represented by grass (80%) and fruit (20%). The weight of 80 kg for deer reported in the CSA (2014) \was adopted in the ecological model for the white-tailed deer.

A.1.5.5 Red Fox

The red fox (*Vulpes vulpes)* is a small mammal that ranges in length between 90 and 112 cm (EC & CWF 2013a). Males weigh an average of 4.1 kg and females weigh an average of 3.4 kg (FSCAP 2012). Red foxes are found throughout Canada in all provinces and territories. They generally occupy a home range between 4 to 8 km^2 and reside in a main underground den and one or more other burrows within their home range (EC & CWF

2013a). The tunnels are up to 10 m long and lead to a chamber 1 to 3 m below surface (U.S. EPA 1993).

Foxes breed between late December and mid-March, and pups are born from March through May, with litter sizes ranging from 1 to 10. Pup-rearing is the primary focus of the red fox during spring and early summer. Their diet is predominantly small mammals such as mice and voles, but they also eat insects, fruits, berries, seeds and nuts. Their diet varies with the seasons, eating mainly small mammals in fall and winter, nesting waterfowl in the spring, and insects and berries in the summer (ECCC & CWF 1993).

For the ecological model it is assumed that the diet of the red fox consists of small mammals represented by meadow voles (20%) and snowshoe hare (20%); soil invertebrates represented by earthworms (25%); small birds represented by the American Robin (10%) and Loggerhead Shrike(10%); and terrestrial vegetation represented by grass (7.5%) and fruit represented by berries (7.5%).

The red fox is a surrogate for the species at risk, grey fox (*Urocyon cinereoargenteus*) which may be found in the study area. The grey fox is designated as “threatened” under the COSEWIC and SARA. The grey fox is not listed under the Manitoba ESEA.

A.1.5.6 Little Brown Myotis

The little brown myotis (*Myotis lucigus*) is found all over Canada with the exception of Nunavut. A reproductive age little brown myotis measures between 0.60 and 1.08 cm in total length and weighs between 0.007 and 0.014 kg. Females are typically larger than males (Naughton 2012).

Although, little brown myotis is known to roost in cavities, they may also roost in vegetation. Between late- April and May, nursing myotis roost in maternity colonies typically located within one kilometer of water and warm enough (between 32 to °36 C) to sustain the growth and development of young. The reminder of the myotis, however, typically roosts in cooler non-maternity cavities in an effort to conserve energy. Between early September and mid-to-late April, the little brown myotis typically hibernates in caves and vacant mines (Naughton 2012).

The little brown myotis typically mates in late summer and autumn. The sperm is kept in the uterus of the female until April or early May when the egg is then fertilized (Naughton 2012). Gestation typically lasts for approximately 50 to 60 days with one pup being born between mid-June and July (Naughton 2012). Young are nursed for approximately 21 days before foraging for food on their own (Naughton 2012). The home range of a nursing little brown myotis in Quebec has been found to decrease from an average of approximately 30 ha to 18 ha between the pregnancy and nursing stage (COSEWIC 2013).

The little brown myotis is an aerial forager that foragers at night near and over water, forests, fields and urban areas. The little brown myotis eats a variety of insects with aquatic

insects making up a portion of the diet (Naughton 2012). The foraging area of the little brown myotis is less than 2 km^2 (COSEWIC 2013).

For the ecological model the diet of the little brown myotis is assumed to consist of insects represented by the earthworm (100%) for the closure phase and aquatic invertebrates represented by benthic invertebrates (100%) for the post-closure phase.

The little brown myotis is designated as "endangered" under COSEWIC, SARA and the Manitoba ESEA. The little brown myotis is a surrogate for the Northern myotis. The Northern myotis is designated as "endangered" under COSEWIC, SARA and the Manitoba ESEA.

A.1.5.7 Moose

The moose (*Alces alces*) is a browse-dependent herbivore that thrives well in early successional forests (Belovsky, 1984; Naughton, 2012). Most moose live in northern and boreal forests of North America near streams, lakes, swamps and muskegs (Forsyth, 1999; Naughton, 2012). The diet of moose consists of aquatic vegetation such as horsetails, burreed and pondweed and early successional woody vegetation that may include willows, balsam fir, quaking aspen, and paper birch (Franzmann, 1981; FCSAP, 2012). Predators of moose include wolves, coyotes and bears (Naughton, 2012).

For the ecological model the diet of the moose is assumed to consist of aquatic plants (20%) and grasses (80%) for the post-closure scenario.

Moose have been identified as of social and cultural importance by the Manitoba Métis Citizens and have therefore been selected as a VC for post-closure. The moose is used to represent large herbivorous mammals that potentially forage near the Site.

A.2 Aquatic Biota

A.2.1 Fish

A.2.1.1 Lake Sturgeon

The Lake Sturgeon (*Acipenser Fulvescens*) is an ancient cold-water benthic freshwater fish that is a member of the Acipenseridae family. The Lake Sturgeon is the largest freshwater fish and species of sturgeon in Canada with a life expectancy between 25 to 50 years (COSEWIC 2006; DFO 2010).

The Lake Sturgeon typically ranges between 90 to 150 cm in length and weigh about 5 to 35kg, with females being heavier than males (DFO 2010). The Lake Sturgeon is found in lakes and large rivers at depths between 5 and 10 m and temperatures between 3 and 24°C (COSEWIC 2006; DFO 2010). In the Winnipeg River, they are also found at water depth greater than 10 m (COSEWIC 2006).

Spawning areas are generally fast flowing waters at depths of 0.6 to 5 m with hardpan clay, sand and rocky bottoms (COSEWIC 2006). Females reach maturity at 14 to 33 years of age, whereas males reach maturity at 14 to 22 years of age (DFO 2010). Spawning takes place in May and early June (DFO 2010; COSEWIC 2006). Females spawn every third to seventh year, whereas males spawn every second to third year (DFO 2010).

Eggs hatch in 5 to 10 days and remain in the substrate until the yolk sac is absorbed. Larvae typically emerge at night, approximately 13-19 days post-hatching, and drift with the downstream current. Larvae are negatively buoyant until their swim bladder is formed, about 60 days post-hatch (DFO 2010; COSEWIC 2006).

Larval Lake Sturgeon feed on amphipods and chironomid larvae, while the diet of juvenile Lake Sturgeon includes oligochaetes, aquatic insects, mollusks, fish eggs and crayfish. Adult Lake Sturgeon feed on a variety of benthic organisms. Some studies have also reported Lake Sturgeon to prey on organism in the water column (e.g., Daphnia) (DFO 2010; COSEWIC 2006).

The Lake Sturgeon in the Winnipeg River are now considered part of the Saskatchewan - Nelson River population and is designated as “Endangered” under COSEWIC (COSWEIC 2017). It is not listed as a SAR under SARA or ESEA.

A.2.1.2 Carmine Shiner

The Carmine Shiner (*Notropis percobromus)* is a small freshwater fish that is a member of the Minnow family, Cprinidae, and a member of the Rosyface Shiner species complex. In Canada, the Carmine Shiner is only found in Manitoba within the Whitemouth River, Birch River, and Winnipeg River systems (DFO 2013a; Watkinson and Sawatzky 2013).

Studies conducted in the Whitemouth River during the summer found Carmine Shiner to inhabit shallow riffles in clear water with sand and gravel substrates (Watkinson and Sawatzky 2013). Although, the Carmine Shiner is not known to migrate, these species may move into deeper pools and eddies in the winter (DFO 2013a).

The Carmine Shiner is mature at about one year of age and has a life expectancy between two and three years. In Manitoba, the Carmine Shiner spawns between mid-June and July in clear water with rocky substrates. Although, there is little known about the spawning habits of the Carmine Shiner, there is some evidence of recurring spawning during the spawning season. The fork length of spawning Carmine Shiner individuals has been measured to be between 0.55 and 0.67 cm (DFO 2013a; Watkinson and Sawatzky 2013).

The Carmine Shiner is known to eat a variety of aquatic invertebrates in the summer. Information about their diet for the other seasons is not known (DFO 2013a).

The Carmine Shiner is designated as “threatened” under the federal Species at Risk Act (SARA) and as of 2018 “endangered” under the Committee on the Status of Endangered

Wildlife in Canada (COSEWIC). It is not listed as a Species at Risk (SAR) under the Manitoba Endangered Species and Ecosystem Act (ESEA).

A.2.1.3 Walleye

Walleye (*Sander vitreus*) is the largest member of the perch family. The Walleye is native to the freshwaters of North America. The Walleye is a cool-water species that prefers turbid waters in either large, shallow lakes or rivers. Adults are generally 33 to 51 cm in length, with an average weight of 0.45 to 1.4 kg. Walleye spawn in the spring or early summer. Adults migrate to the rocky areas in white water below impassable falls and dams in rivers, or boulder to coarse-gravel shoals of lakes. Spawning takes place at night and the eggs fall into crevices in the rocky substrate. The eggs hatch in 12 to 18 days and by 10 to 15 days after hatching, the young disperse into the upper levels of open water. As the Walleye increases in size, its diet shifts from invertebrates to fishes (DFO 2013b).

Winnipeg River is known to support Walleye (CNL 2016). The Walleye is a surrogate for pelagic fish such as Northern Pike and Mooneye (*Hiodon tergisus*) also supported by the Winnipeg River.

A.2.2 Aquatic Plants

For the ecological model aquatic plants were represented by freshwater submerged and emergent macrophyte. Macrophytes are foundation species in the freshwater ecosystem. Macrophytes are primary producers that provide food, cover and shelter for wildlife, such as spawning and nursey habitats for fish and nesting habitats for waterfowl, improve water quality and clarity, and help to stabilize shorelines and bottom sediments. Aquatic plants were used as a food source for the Trumpeter Swan and Mallard (wild waterfowl) in the ecological model.

A.2.3 Benthic Invertebrates

Benthic invertebrates or “benthos” live and feed within sediments. Benthic invertebrates include, among others, amphipods, bivalves, shrimps, crabs, snails, worms, and aquatic insects. They play an integral role in the integrity of the freshwater ecosystem through their role in nutrient cycling and function as an important food source for wildlife such as the ducks and fish. Benthic invertebrates provide the sediment to fish pathway link and a link between aquatic and terrestrial ecosystems. Many species feed on decaying organic matter and thereby form an important link between the decomposer and primary consumer levels.

Benthic invertebrates are being model for the Winnipeg River for the post-closure scenario.

A.3 Riparian Birds

A.3.1 Horned Grebe

The Horned Grebe (*Podiceps auritus*), which weighs between 0.30 and 0.57 kg, is a migrant water bird that breeds within Canada (Stedman 2000). In Canada, southwestern Manitoba hosts the highest breeding densities of these birds (NatureServe 2015). Although, there is little information on the migratory route of the Horned Grebe, they have been observed resting on lakes and rivers (COSEWIC 2009).

The Horned Grebe breeds on small to medium sizes freshwater lakes, ponds and marshes with open water and emergent vegetation. Nests are often placed on emergent vegetation or floating vegetation in shallow water as well as on rocks and man-made structures (Stedman 2000; COSEWIC 2009). The female lays an average clutch size of 4 to 6 eggs (NatureServe 2015). In southern Canada, eggs are usually laid between mid-May and July (NatureServe 2015). If clutches are destroyed, the Horned Grebe can renest and lay up to four replacements clutches (COSEWIC 2009). Incubation lasts about 22 to 25 days with both the female and male sharing in the incubation duties (NatureServe 2015). Young depend on adults for food until 14 days of age with independent foraging beginning around 19 to 21 days of age and fledging at around 6 to 7 weeks of age (COSEWIC 2009; NatureServe 2015). The mean territory range of the Horned Grebe is approximately 0.78 ha (COSEWIC 2009)

The Horned Grebe forages for its food by diving under shallow water or gleaning food on the surface of water or vegetation (Stedman 2000; NatureServe 2015). The diet of the Horned Grebe consists of mostly forage fish and aquatic invertebrates (insects) in the summer (Stedman 2000; COSEWIC 2009; NatureServe 2015). For the ecological model, it is assumed that the diet of the Horned Grebe consists of fish (40%) and benthic invertebrates (60%).

The Horned Grebe is designated as “special concern” under COSEWIC. The Horned Grebe is not listed under SARA and the Manitoba ESEA.

The Horned Grebe will also be used as a surrogate for the Least Bittern (*Ixobrychus exilis*), a species designated as “threatened” under COSEWIC and SARA, and “endangered” under the Manitoba ESEA.

A.3.2 Trumpeter Swan

The Trumpeter Swan (*Cygnus buccinator*) is a large bird with white feathers and black legs and feet. The Trumpeter Swan weighs between 7.7 and 12.7 kg (Mitchell *et al*. 2010)

Trumpeter Swans are found in Canada year round. In winter they congregate in areas where water does not freeze and food is available. Breeding birds select nest sites that are surrounded by water from 10 cm to several metres in depth. They frequently construct their

nests on old beaver houses and dams or emergent vegetation even before a site is completely free of ice. Most nests are used year after year, usually by the same pair. A female produces an average of 5 or 6 eggs which she incubates for about 32 days until they hatch. The cygnets grow from approximately 0.30 kg at hatching to approximately 7 kg at fledging. During summer, trumpeters feed on leaves, tubers, and roots of aquatic plants at depths up to 1 m, which they reach by dipping their heads and necks, or by up-ending. The cygnets, or young, feed predominately on insects and other invertebrates for the first few weeks of life but may start feeding on plants before they are two weeks old (ECCC & CWF 1992).

For the ecological model it is assumed that the Trumpeter Swan diet consists of aquatic plants (100%).

The Trumpeter Swan is designated as “special concern” under COSEWIC. The Horned Grebe is not listed under SARA and the Manitoba ESEA. Trumpeter Swans have been sighted by WL staff in the area (e.g. secondary cell of lagoon) during the summer months of 2015.

A.3.3 Mallard (Wild Waterfowl)

The Mallard (*Anas platyrhynchos*) is an omnivorous migratory duck that may breed over winter in Canada (U.S. EPA 1993; FCSAP 2012). Males weigh an average 1.2 kg and females weigh an average of 1.0 kg (U.S. EPA 1993). The general habitat of the Mallard is wetlands. Mallard typically nest on the ground in thick vegetation away from a waterbody. The female lays a clutch of 1 to 13 eggs with hatching occurring about 23 to 30 days later (Drilling *et al.* 2002). Ducklings remain in the nest only 13 to 16 hours before leaving the nest (Drilling *et al*. 2002).

The bulk of the Mallard`s diet is plant material (mostly aquatic plants and seeds) with the remaining portions of the diet consisting of aquatic invertebrates, especially in the breeding season (FCSAP 2012). The Mallard forages by dabbling and filtering though sediment (U.S. EPA 1993).

The mean home range of a Mallard is between 111 and 620 hectares in spring (U.S. EPA 1993).

For the ecological model, it is assumed that the diet of the Mallard consists of benthic invertebrates (40%) and aquatic plants (60%) (Hart and Burt 2013).

A.4 Riparian Mammals

A.4.1 American Mink

The American mink (*Neovision vison*) is found throughout Canada, except in areas beyond the tree line in northern Canada. An adult American mink measures between 42 and 65 cm

in total length and weighs between 0.42 and 1.7 kg with males being typically larger than females (Naughton 2012).

The American mink is a carnivore that generally lives near water, but may live in dry areas if prey is abundant. The American mink lives in brush piles, hollow logs, rock crevices, cavities in trees or under waterside trees, as well as in the dens of abandoned lodges and burrows constructed by other animals. The home range of a male American mink may range between 1.5 and over 16 km^2 depending on the abundancy of available food and habitat in the area. Male mink have a larger home range compared to females (Naughton 2012).

The American mink mates between February and May with the implantation of the fertilized egg in the uterus wall being delayed by approximately 8 to 45 days. Pregnancy in the American mink typically lasts an average of 51 days with active gestation (when the egg is implanted) lasting between 28 and 32 days. Females typically produce one litter per year between April and June with an average litter size of four. Young are weaned at 32 to 35 days old and juveniles start to forage at about eight weeks of age (Naughton 2012).

The diet of American mink consist of small slow-moving fish, frogs, muskrats, small rodents, rabbits and hares, birds, bird eggs, reptiles and invertebrates including crayfish, insects, and snails. Carrion, large or fast-moving fish and smaller weasel may be occasionally consumed. While foraging, the American mink may travel up to 12 km (Naughton 2012).

For the ecological model it is assumed that the diet of the American Mink consists of fish (85%) and benthic invertebrates (15%).

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Appendix B Exposure Factors Used in Calculations

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(fw animal)	770	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(fw animal)	770	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(fw animal)	800	CSA N288.1-14	Table A.25e	
Am-241	L/kg(fw animal)	1200	CSA N288.1-14	Table A.25e	
Am-243	L/kg(fw animal)	1200	CSA N288.1-14	Table A.25e	
Bi-210	L/kg(fw animal)	81	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(fw animal)	5200	CSA N288.1-14	Table A.25e	
Ca-41	L/kg(fw animal)	240	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(fw animal)	140	CSA N288.1-14	Table A.25e	
Cm-244	L/kg(fw animal)	2100	CSA N288.1-14	Table A.25e	
Co-60	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Cs-137	L/kg(fw animal)	99	CSA N288.1-14	Table A.25e	
Eu-152	L/kg(fw animal)	60	CSA N288.1-14	Table A.25e	
Eu-154	L/kg(fw animal)	60	CSA N288.1-14	Table A.25e	
Eu-155	L/kg(fw animal)	60	CSA N288.1-14	Table A.25e	
Fe-55	L/kg(fw animal)	2800	CSA N288.1-14	Table A.25e	
Gd-152	L/kg(fw animal)	1000	CSA N288.1-14	Table A.25e	
HTO	L/kg(fw animal)	0.75	CSA N288.1-14	Table A.25e	
I-129	L/kg(fw animal)	9.6	CSA N288.1-14	Table A.25e	
Nb-94	L/kg(fw animal)	100	CSA N288.1-14	Table A.25e	
Ni-59	L/kg(fw animal)	100	CSA N288.1-14	Table A.25e	
Ni-63	L/kg(fw animal)	100	CSA N288.1-14	Table A.25e	
Np-237	L/kg(fw animal)	820	CSA N288.1-14	Table A.25e	
Np-239	L/kg(fw animal)	820	CSA N288.1-14	Table A.25e	
OBT	L/kg(fw animal)	0.14	CSA N288.1-14	Table A.25e	
Pa-231	L/kg(fw animal)	99	CSA N288.1-14	Table A.25e	
Pa-233	L/kg(fw animal)	99	CSA N288.1-14	Table A.25e	
Pb-210	L/kg(fw animal)	590	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(fw animal)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(fw animal)	720	CSA N288.1-14	Table A.25e	
Pu-239	L/kg(fw animal)	720	CSA N288.1-14	Table A.25e	
Pu-240	L/kg(fw animal)	720	CSA N288.1-14	Table A.25e	
Pu-241	L/kg(fw animal)	720	CSA N288.1-14	Table A.25e	
Ra-223	L/kg(fw animal)	900	CSA N288.1-14	Table A.25e	
Ra-224	L/kg(fw animal)	900	CSA N288.1-14	Table A.25e	
Ra-225	L/kg(fw animal)	900	CSA N288.1-14	Table A.25e	
Ra-226	L/kg(fw animal)	900	CSA N288.1-14	Table A.25e	
Ra-228	L/kg(fw animal)	900	CSA N288.1-14	Table A.25e	
Sr-90	L/kg(fw animal)	240	CSA N288.1-14	Table A.25e	
Tc-99	L/kg(fw animal)	9.5	CSA N288.1-14	Table A.25e	
Th-227	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-228	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-229	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-230	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-231	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-232	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
Th-234	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
U-233	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
U-234	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
U-235	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
U-236	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	
U-238	L/kg(fw animal)	110	CSA N288.1-14	Table A.25e	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	2.06E-05	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ERICA 1.2.1	Database	Insect larvae; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.05E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	1.17E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.80E-05			Insect larvae; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.53E-06	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.10E-04			Insect larvae; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	3.30E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	5.20E-05			Insect larvae; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	9.80E-05			Insect larvae; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	5.10E-05			Insect larvae; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	1.10E-04			Insect larvae; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.14	crab; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	2.99E-06	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.78E-06			Insect larvae; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	3.60E-05			Insect larvae; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	8.10E-05			Insect larvae; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	3.30E-06	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	9.80E-06			Insect larvae; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.77E-02			Insect larvae; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.36E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.78E-06			Insect larvae; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.02E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	1.40E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	3.10E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.20E-02			Insect larvae; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02			Insect larvae; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02			Insect larvae; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.66E-06			Insect larvae; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.60E-01	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.38E-01	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.37E-01	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	1.60E-04	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	2.10E-04			Insect larvae; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.30E-05			Insect larvae; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.88E-01			Insect larvae; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	2.80E-02	ICRP 108 (2008)	Table C.14	crab; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	2.70E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	9.20E-05			Insect larvae; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	2.30E-02			Insect larvae; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	1.60E-04			Insect larvae; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.14	crab; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.80E-02			Insect larvae; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.60E-02			Insect larvae; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	2.60E-02	ERICA 1.2.1	Database	insect larvae; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	2.40E-02			Insect larvae; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.96E-04	ERICA 1.2.1	Database	insect larvae
Ac-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.46E-07	ERICA 1.2.1	Database	insect larvae
Ag-108m	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.59E-04	ERICA 1.2.1	Database	insect larvae
Am-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.80E-05			Insect larvae
Am-243	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.46E-04	ERICA 1.2.1	Database	insect larvae
Bi-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.07E-04	ERICA 1.2.1	Database	insect larvae
C-14	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.20E-07			Insect larvae
Ca-41	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.69E-08	ERICA 1.2.1	Database	insect larvae
Cl-36	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.10E-05			Insect larvae
Cm-244	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.20E-07	ERICA 1.2.1	Database	insect larvae
Co-60	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.0014			Insect larvae
Cs-137	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.70E-04			Insect larvae
Eu-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.80E-04			Insect larvae
Eu-154	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.70E-04			Insect larvae
Eu-155	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.92E-05	ICRP 108 (2008)	Table C.14	crab value
Fe-55	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.10E-07	ERICA 1.2.1	Database	insect larvae
Gd-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	ERICA 1.2.1	Database	insect larvae
HTO	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.40E-13			Insect larvae
I-129	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-05			Insect larvae
Nb-94	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.20E-04			Insect larvae
Ni-59	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.90E-07	ERICA 1.2.1	Database	insect larvae
Ni-63	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.40E-08			Insect larvae
Np-237	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.00E-05			Insect larvae
Np-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.14E-04	ERICA 1.2.1	Database	insect larvae
OBT	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.75E-05	ERICA 1.2.1	Database	insect larvae
Pa-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.29E-04	ERICA 1.2.1	Database	insect larvae
Pb-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.10E-04	ERICA 1.2.1	Database	insect larvae
Po-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.90E-09	ERICA 1.2.1	Database	insect larvae
Pu-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.90E-07			Insect larvae
Pu-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.00E-07			Insect larvae
Pu-240	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.40E-07			Insect larvae
Pu-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-09			Insect larvae
Ra-223	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.77E-04	ERICA 1.2.1	Database	insect larvae
Ra-224	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.35E-03	ERICA 1.2.1	Database	insect larvae
Ra-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.28E-04	ERICA 1.2.1	Database	insect larvae
Ra-226	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.30E-03			Insect larvae
Ra-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.80E-04	ERICA 1.2.1	Database	insect larvae
Sr-90	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.40E-04			Insect larvae
Tc-99	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.30E-06			Insect larvae
Th-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.40E-05	ERICA 1.2.1	Database	insect larvae
Th-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.30E-03			Insect larvae
Th-229	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.17E-05	ICRP 108 (2008)	Table C.14	crab value
Th-230	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.00E-07	ERICA 1.2.1	Database	insect larvae
Th-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.80E-05	ERICA 1.2.1	Database	insect larvae
Th-232	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.40E-07			Insect larvae
Th-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.70E-04			Insect larvae
U-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.38E-07	ICRP 108 (2008)	Table C.14	crab value
U-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.40E-07			Insect larvae
U-235	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.10E-04			Insect larvae
U-236	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.39E-07	ERICA 1.2.1	Database	insect larvae
U-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.20E-07			Insect larvae

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.25	CSA N288.1-14	cl. 7.7.4.2	DWaa; value for freshwater crustacea
Water Equivalent Of Dry Matter	L/kg(dw)	0.7	CSA N288.1-14	cl.7.7.4.5	
Stable Carbon Concentration	g-C/kg(dw)	444	CSA N288.1-14	cl. 7.7.5.4	X6; fw value for marine crustacea (111 gC/kg(fw)) divided by 0.25 kg(dw)/kg(fw)
Fraction of time spent immersed in sediment	[]	1	EcoMetrix Suggestion 2014		OFs; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent in the water column	[]	0	EcoMetrix Suggestion 2014		OFw; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the water surface	[]	0	EcoMetrix Suggestion 2014		OFws; dose eq'n N288.6 cl. 7.3.4.1.2

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg (fw animal)	15	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg (fw animal)	15	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(fw animal)	110	CSA N288.1-14	Table A.25a	
Am-241	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Am-243	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Bi-210	L/kg (fw animal)	37	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg (fw animal)	5700	CSA N288.1-14	Table A.25a	
Ca-41	L/kg (fw animal)	2	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg (fw animal)	47	CSA N288.1-14	Table A.25a	
Cm-244	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
Co-60	L/kg (fw animal)	54	CSA N288.1-14	Table A.25a	
Cs-137	L/kg (fw animal)	3500	CSA N288.1-14	Table A.25a	
Eu-152	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Eu-154	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Eu-155	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Fe-55	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Gd-152	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
HTO	L/kg (fw animal)	0.75	CSA N288.1-14	Table A.25a	
I-129	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Nb-94	L/kg (fw animal)	300	CSA N288.1-14	Table A.25a	
Ni-59	L/kg (fw animal)	21	CSA N288.1-14	Table A.25a	
Ni-63	L/kg (fw animal)	21	CSA N288.1-14	Table A.25a	
Np-237	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
Np-239	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
OBT	L/kg (fw animal)	0.14	CSA N288.1-14	Table A.25a	
Pa-231	L/kg (fw animal)	10	CSA N288.1-14	Table A.25a	
Pa-233	L/kg (fw animal)	10	CSA N288.1-14	Table A.25a	
Pb-210	L/kg (fw animal)	3000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg (fw animal)	150	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-239	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-240	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-241	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Ra-223	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-224	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-225	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-226	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-228	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Sr-90	L/kg (fw animal)	2	CSA N288.1-14	Table A.25a	
Tc-99	L/kg (fw animal)	20	CSA N288.1-14	Table A.25a	
Th-227	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-228	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-229	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-230	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-231	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-232	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-234	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
U-233	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-234	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-235	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-236	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-238	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.15911	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.73E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.58E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	2.13E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.83E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.46E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.10	trout; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.08E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.10	trout; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.33E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.0031	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.43E-01	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.50E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	benthic fish; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.16E-04	ERICA 1.2.1	Database	benthic fish
Ac-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.67E-08	ERICA 1.2.1	Database	benthic fish
Ag-108m	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.06E-04	ERICA 1.2.1	Database	benthic fish
Am-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.08E-05	ICRP 108 (2008)	Table C.10	trout value
Am-243	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.07E-04	ERICA 1.2.1	Database	benthic fish
Bi-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.92E-06	ERICA 1.2.1	Database	benthic fish
C-14	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.79E-08	ICRP 108 (2008)	Table C.10	trout value
Ca-41	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.94E-09	ERICA 1.2.1	Database	benthic fish
Cl-36	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.33E-06	ICRP 108 (2008)	Table C.10	trout value
Cm-244	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.40E-07	ERICA 1.2.1	Database	benthic fish
Co-60	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.001292	ICRP 108 (2008)	Table C.10	trout value
Cs-137	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.83E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.83E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-154	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.25E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-155	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.88E-05	ICRP 108 (2008)	Table C.10	trout value
Fe-55	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.39E-08	ERICA 1.2.1	Database	benthic fish
Gd-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	ERICA 1.2.1	Database	benthic fish
HTO	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.54E-13	ICRP 108 (2008)	Table C.10	trout value
I-129	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.50E-06	ICRP 108 (2008)	Table C.10	trout value
Nb-94	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.92E-04	ICRP 108 (2008)	Table C.10	trout value
Ni-59	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.30E-08	ERICA 1.2.1	Database	benthic fish
Ni-63	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.13E-09	ICRP 108 (2008)	Table C.10	trout value
Np-237	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.25E-05	ICRP 108 (2008)	Table C.10	trout value
Np-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.13E-05	ERICA 1.2.1	Database	benthic fish
OBT	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.86E-05	ERICA 1.2.1	Database	benthic fish
Pa-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.77E-05	ERICA 1.2.1	Database	benthic fish
Pb-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.80E-06	ERICA 1.2.1	Database	benthic fish
Po-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.30E-09	ERICA 1.2.1	Database	benthic fish
Pu-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-07	ICRP 108 (2008)	Table C.10	trout value
Pu-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-08	ICRP 108 (2008)	Table C.10	trout value
Pu-240	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.42E-07	ICRP 108 (2008)	Table C.10	trout value
Pu-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-10	ICRP 108 (2008)	Table C.10	trout value
Ra-223	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.51E-04	ERICA 1.2.1	Database	benthic fish
Ra-224	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.31E-04	ERICA 1.2.1	Database	benthic fish
Ra-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.25E-04	ERICA 1.2.1	Database	benthic fish
Ra-226	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.17E-04	ICRP 108 (2008)	Table C.10	trout value
Ra-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.90E-04	ERICA 1.2.1	Database	benthic fish
Sr-90	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.33E-05	ICRP 108 (2008)	Table C.10	trout value
Tc-99	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.21E-07	ICRP 108 (2008)	Table C.10	trout value
Th-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.10E-05	ERICA 1.2.1	Database	benthic fish
Th-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.00E-04	ICRP 108 (2008)	Table C.10	trout value
Th-229	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.17E-05	ICRP 108 (2008)	Table C.10	trout value
Th-230	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.40E-07	ERICA 1.2.1	Database	benthic fish
Th-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.70E-06	ERICA 1.2.1	Database	benthic fish
Th-232	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-07	ICRP 108 (2008)	Table C.10	trout value
Th-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.08E-05	ICRP 108 (2008)	Table C.10	trout value
U-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.25E-07	ICRP 108 (2008)	Table C.10	trout value
U-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-07	ICRP 108 (2008)	Table C.10	trout value
U-235	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-05	ICRP 108 (2008)	Table C.10	trout value
U-236	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.20E-07	ERICA 1.2.1	Database	benthic fish
U-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.00E-07	ICRP 108 (2008)	Table C.10	trout value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.25	CSA N288.1-14	cl. 7.7.4.2	DWaa; value for fish
Water Equivalent Of Dry Matter	L/kg(dw)	0.7	CSA N288.1-14	cl.7.7.4.5	
Stable Carbon Concentration	g-C/kg(dw)	487	CSA N288.1-14	Table 23	X6; fw value for freshwater fish (121.75 gC/kg(fw)) divided by 0.25 kg(dw)/kg(fw)
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the sediment surface	[]	0.5	EcoMetrix Suggestion 2014		OFss; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent in the water column	[]	0.5	EcoMetrix Suggestion 2014		OFw; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the water surface	[]	0	EcoMetrix Suggestion 2014		OFws; dose eq'n N288.6 cl. 7.3.4.1.2

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg (fw animal)	15	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg (fw animal)	15	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(fw animal)	110	CSA N288.1-14	Table A.25a	
Am-241	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Am-243	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Bi-210	L/kg (fw animal)	37	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg (fw animal)	5700	CSA N288.1-14	Table A.25a	
Ca-41	L/kg (fw animal)	2	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg (fw animal)	47	CSA N288.1-14	Table A.25a	
Cm-244	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
Co-60	L/kg (fw animal)	54	CSA N288.1-14	Table A.25a	
Cs-137	L/kg (fw animal)	3500	CSA N288.1-14	Table A.25a	
Eu-152	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Eu-154	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Eu-155	L/kg (fw animal)	130	CSA N288.1-14	Table A.25a	
Fe-55	L/kg (fw animal)	240	CSA N288.1-14	Table A.25a	
Gd-152	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
HTO	L/kg (fw animal)	0.75	CSA N288.1-14	Table A.25a	
I-129	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Nb-94	L/kg (fw animal)	300	CSA N288.1-14	Table A.25a	
Ni-59	L/kg (fw animal)	21	CSA N288.1-14	Table A.25a	
Ni-63	L/kg (fw animal)	21	CSA N288.1-14	Table A.25a	
Np-237	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
Np-239	L/kg (fw animal)	30	CSA N288.1-14	Table A.25a	
OBT	L/kg (fw animal)	0.14	CSA N288.1-14	Table A.25a	
Pa-231	L/kg (fw animal)	10	CSA N288.1-14	Table A.25a	
Pa-233	L/kg (fw animal)	10	CSA N288.1-14	Table A.25a	
Pb-210	L/kg (fw animal)	3000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg (fw animal)	150	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-239	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-240	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Pu-241	L/kg (fw animal)	21000	CSA N288.1-14	Table A.25a	
Ra-223	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-224	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-225	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-226	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Ra-228	L/kg (fw animal)	4	CSA N288.1-14	Table A.25a	
Sr-90	L/kg (fw animal)	2	CSA N288.1-14	Table A.25a	
Tc-99	L/kg (fw animal)	20	CSA N288.1-14	Table A.25a	
Th-227	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-228	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-229	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-230	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-231	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-232	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
Th-234	L/kg (fw animal)	6	CSA N288.1-14	Table A.25a	
U-233	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-234	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-235	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-236	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	
U-238	L/kg (fw animal)	0.96	CSA N288.1-14	Table A.25a	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.15911	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.64E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.58E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	2.13E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.83E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.46E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.10	trout; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.08E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.68E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.10	trout; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.32E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.0031	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.43E-01	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.50E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	2.71E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	pelagic fish; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.10	trout; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.18E-04	ERICA 1.2.1	Database	Pelagic fish
Ac-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.81E-08	ERICA 1.2.1	Database	Pelagic fish
Ag-108m	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.15E-04	ERICA 1.2.1	Database	Pelagic fish
Am-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.08E-05	ICRP 108 (2008)	Table C.10	trout value
Am-243	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.08E-04	ERICA 1.2.1	Database	Pelagic fish
Bi-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.10E-06	ERICA 1.2.1	Database	Pelagic fish
C-14	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.79E-08	ICRP 108 (2008)	Table C.10	trout value
Ca-41	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.04E-09	ERICA 1.2.1	Database	Pelagic fish
Cl-36	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.33E-06	ICRP 108 (2008)	Table C.10	trout value
Cm-244	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-07	ERICA 1.2.1	Database	Pelagic fish
Co-60	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.001292	ICRP 108 (2008)	Table C.10	trout value
Cs-137	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.83E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.83E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-154	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.25E-04	ICRP 108 (2008)	Table C.10	trout value
Eu-155	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.88E-05	ICRP 108 (2008)	Table C.10	trout value
Fe-55	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.47E-08	ERICA 1.2.1	Database	Pelagic fish
Gd-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	ERICA 1.2.1	Database	Pelagic fish
HTO	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.54E-13	ICRP 108 (2008)	Table C.10	trout value
I-129	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.50E-06	ICRP 108 (2008)	Table C.10	trout value
Nb-94	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.92E-04	ICRP 108 (2008)	Table C.10	trout value
Ni-59	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.50E-08	ERICA 1.2.1	Database	Pelagic fish
Ni-63	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.13E-09	ICRP 108 (2008)	Table C.10	trout value
Np-237	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.25E-05	ICRP 108 (2008)	Table C.10	trout value
Np-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.24E-05	ERICA 1.2.1	Database	Pelagic fish
OBT	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.89E-05	ERICA 1.2.1	Database	Pelagic fish
Pa-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.90E-05	ERICA 1.2.1	Database	Pelagic fish
Pb-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.00E-06	ERICA 1.2.1	Database	Pelagic fish
Po-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.30E-09	ERICA 1.2.1	Database	Pelagic fish
Pu-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-07	ICRP 108 (2008)	Table C.10	trout value
Pu-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-08	ICRP 108 (2008)	Table C.10	trout value
Pu-240	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.42E-07	ICRP 108 (2008)	Table C.10	trout value
Pu-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-10	ICRP 108 (2008)	Table C.10	trout value
Ra-223	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.53E-04	ERICA 1.2.1	Database	Pelagic fish
Ra-224	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.40E-04	ERICA 1.2.1	Database	Pelagic fish
Ra-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.29E-04	ERICA 1.2.1	Database	Pelagic fish
Ra-226	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.17E-04	ICRP 108 (2008)	Table C.10	trout value
Ra-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.00E-04	ERICA 1.2.1	Database	Pelagic fish
Sr-90	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.33E-05	ICRP 108 (2008)	Table C.10	trout value
Tc-99	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.21E-07	ICRP 108 (2008)	Table C.10	trout value
Th-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.20E-05	ERICA 1.2.1	Database	Pelagic fish
Th-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.00E-04	ICRP 108 (2008)	Table C.10	trout value
Th-229	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.17E-05	ICRP 108 (2008)	Table C.10	trout value
Th-230	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.50E-07	ERICA 1.2.1	Database	Pelagic fish
Th-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.90E-06	ERICA 1.2.1	Database	Pelagic fish
Th-232	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-07	ICRP 108 (2008)	Table C.10	trout value
Th-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.08E-05	ICRP 108 (2008)	Table C.10	trout value
U-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.25E-07	ICRP 108 (2008)	Table C.10	trout value
U-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-07	ICRP 108 (2008)	Table C.10	trout value
U-235	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.33E-05	ICRP 108 (2008)	Table C.10	trout value
U-236	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.28E-07	ERICA 1.2.1	Database	Pelagic fish
U-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.00E-07	ICRP 108 (2008)	Table C.10	trout value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.25	CSA N288.1-14	cl. 7.7.4.2	DWaa; value for fish
Water Equivalent Of Dry Matter	L/kg(dw)	0.7	CSA N288.1-14	cl.7.7.4.5	
Stable Carbon Concentration	g-C/kg(dw)	487	CSA N288.1-14	Table 23	X6; fw value for freshwater fish (121.75 gC/kg(fw)) divided by 0.25 kg(dw)/kg(fw)
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent in the water column	[]	1	EcoMetrix Suggestion 2014		OFw; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the water surface	[]	0	EcoMetrix Suggestion 2014		OFws; dose eq'n N288.6 cl. 7.3.4.1.2

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(fw)	3300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(fw)	3300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(fw)	34	CSA N288.1-14	Table A.25f	
Am-241	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Am-243	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Bi-210	L/kg(fw)	32	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(fw)	5900	CSA N288.1-14	Table A.25f	
Ca-41	L/kg(fw)	370	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(fw)	50	CSA N288.1-14	Table A.25f	
Cm-244	L/kg(fw)	6700	CSA N288.1-14	Table A.25f	
Co-60	L/kg(fw)	790	CSA N288.1-14	Table A.25f	
Cs-137	L/kg(fw)	220	CSA N288.1-14	Table A.25f	
Eu-152	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Eu-154	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Eu-155	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Fe-55	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Gd-152	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
HTO	L/kg(fw)	0.75	CSA N288.1-14	Table A.25f	
I-129	L/kg(fw)	71	CSA N288.1-14	Table A.25f	
Nb-94	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ni-59	L/kg(fw)	52	CSA N288.1-14	Table A.25f	
Ni-63	L/kg(fw)	52	CSA N288.1-14	Table A.25f	
Np-237	L/kg(fw)	1900	CSA N288.1-14	Table A.25f	
Np-239	L/kg(fw)	1900	CSA N288.1-14	Table A.25f	
OBT	L/kg(fw)	0.11	CSA N288.1-14	Table A.25f	
Pa-231	L/kg(fw)	300	CSA N288.1-14	Table A.25f	
Pa-233	L/kg(fw)	300	CSA N288.1-14	Table A.25f	
Pb-210	L/kg(fw)	100	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(fw)	450	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-239	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-240	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-241	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Ra-223	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-224	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-225	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-226	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-228	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Sr-90	L/kg(fw)	370	CSA N288.1-14	Table A.25f	
Tc-99	L/kg(fw)	7.6	CSA N288.1-14	Table A.25f	
Th-227	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-228	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-229	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-230	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-231	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-232	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-234	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
U-233	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-234	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-235	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-236	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-238	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.85E-04	ERICA 1.2.1	Database	Phytoplankton
Ac-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-07	ERICA 1.2.1	Database	Phytoplankton
Ag-108m	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.68E-04	ERICA 1.2.1	Database	Phytoplankton
Am-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-05	ICRP 108 (2008)	Table C.21	seaweed value
Am-243	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.62E-04	ERICA 1.2.1	Database	Phytoplankton
Bi-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-04	ERICA 1.2.1	Database	Phytoplankton
C-14	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.17E-07	ICRP 108 (2008)	Table C.21	seaweed value
Ca-41	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.65E-08	ERICA 1.2.1	Database	Phytoplankton
Cl-36	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.38E-05	ICRP 108 (2008)	Table C.21	seaweed value
Cm-244	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.79E-07	ERICA 1.2.1	Database	Phytoplankton
Co-60	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.001417	ICRP 108 (2008)	Table C.21	seaweed value
Cs-137	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.29E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.67E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-154	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.08E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-155	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.38E-05	ICRP 108 (2008)	Table C.21	seaweed value
Fe-55	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.79E-07	ERICA 1.2.1	Database	Phytoplankton
Gd-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	ERICA 1.2.1	Database	Phytoplankton
HTO	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.33E-09	ICRP 108 (2008)	Table C.21	seaweed value
I-129	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.25E-05	ICRP 108 (2008)	Table C.21	seaweed value
Nb-94	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.75E-04	ICRP 108 (2008)	Table C.21	seaweed value
Ni-59	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.03E-07	ERICA 1.2.1	Database	Phytoplankton
Ni-63	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.04E-08	ICRP 108 (2008)	Table C.21	seaweed value
Np-237	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-05	ICRP 108 (2008)	Table C.21	seaweed value
Np-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.30E-04	ERICA 1.2.1	Database	Phytoplankton
OBT	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.85E-05	ERICA 1.2.1	Database	Phytoplankton
Pa-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.42E-04	ERICA 1.2.1	Database	Phytoplankton
Pb-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.66E-04	ERICA 1.2.1	Database	Phytoplankton
Po-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.95E-09	ERICA 1.2.1	Database	Phytoplankton
Pu-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.58E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.08E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-240	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.58E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.29E-09	ICRP 108 (2008)	Table C.21	seaweed value
Ra-223	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.08E-04	ERICA 1.2.1	Database	Phytoplankton
Ra-224	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.44E-03	ERICA 1.2.1	Database	Phytoplankton
Ra-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.08E-03	ERICA 1.2.1	Database	Phytoplankton
Ra-226	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.13E-03	ICRP 108 (2008)	Table C.21	seaweed value
Ra-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.35E-04	ERICA 1.2.1	Database	Phytoplankton
Sr-90	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.83E-04	ICRP 108 (2008)	Table C.21	seaweed value
Tc-99	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.29E-06	ICRP 108 (2008)	Table C.21	seaweed value
Th-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.63E-05	ERICA 1.2.1	Database	Phytoplankton
Th-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.00E-03	ICRP 108 (2008)	Table C.21	seaweed value
Th-229	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.00E-05	ICRP 108 (2008)	Table C.21	seaweed value
Th-230	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.10E-06	ERICA 1.2.1	Database	Phytoplankton
Th-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.19E-05	ERICA 1.2.1	Database	Phytoplankton
Th-232	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.38E-07	ICRP 108 (2008)	Table C.21	seaweed value
Th-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.58E-04	ICRP 108 (2008)	Table C.21	seaweed value
U-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.13E-07	ICRP 108 (2008)	Table C.21	seaweed value
U-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.17E-07	ICRP 108 (2008)	Table C.21	seaweed value
U-235	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.58E-05	ICRP 108 (2008)	Table C.21	seaweed value
U-236	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.47E-07	ERICA 1.2.1	Database	Phytoplankton
U-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.17E-07	ICRP 108 (2008)	Table C.21	seaweed value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15884	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	##########	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.05E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	6.18E-05	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.52E-06	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.46E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.03343	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	8.75E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	1.38E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	7.92E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	1.67E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	3.79E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	2.92E-06	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.21	seaweed; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	3.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	1.17E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	3.92E-06	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	1.20E-04	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.21	seaweed; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	8.89E-05	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.17E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.52E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.60E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.38E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.38E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	2.58E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	4.58E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.37E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.84E-01	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.028233	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	1.00E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02292	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	3.67E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.02547	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025992	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.25	CSA N288.1-14	cl. 7.7.4.2	DWap; value for freshwater both types of macrophytes
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl.7.7.4.5	
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 7.7.5.6	X7; value for terrestrial plants
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; fraction of plant near sediment; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent in the water column	[]	1	EcoMetrix Suggestion 2014		OFw; fraction of plant in water column; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the water surface	[]	0	EcoMetrix Suggestion 2014		OFws; dose eq'n N288.6 cl. 7.3.4.1.2

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(fw)	3300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(fw)	3300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(fw)	34	CSA N288.1-14	Table A.25f	
Am-241	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Am-243	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Bi-210	L/kg(fw)	32	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(fw)	5900	CSA N288.1-14	Table A.25f	
Ca-41	L/kg(fw)	370	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(fw)	50	CSA N288.1-14	Table A.25f	
Cm-244	L/kg(fw)	6700	CSA N288.1-14	Table A.25f	
Co-60	L/kg(fw)	790	CSA N288.1-14	Table A.25f	
Cs-137	L/kg(fw)	220	CSA N288.1-14	Table A.25f	
Eu-152	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Eu-154	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Eu-155	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
Fe-55	L/kg(fw)	3100	CSA N288.1-14	Table A.25f	
Gd-152	L/kg(fw)	5000	CSA N288.1-14	Table A.25f	
HTO	L/kg(fw)	0.75	CSA N288.1-14	Table A.25f	
I-129	L/kg(fw)	71	CSA N288.1-14	Table A.25f	
Nb-94	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ni-59	L/kg(fw)	52	CSA N288.1-14	Table A.25f	
Ni-63	L/kg(fw)	52	CSA N288.1-14	Table A.25f	
Np-237	L/kg(fw)	1900	CSA N288.1-14	Table A.25f	
Np-239	L/kg(fw)	1900	CSA N288.1-14	Table A.25f	
OBT	L/kg(fw)	0.11	CSA N288.1-14	Table A.25f	
Pa-231	L/kg(fw)	300	CSA N288.1-14	Table A.25f	
Pa-233	L/kg(fw)	300	CSA N288.1-14	Table A.25f	
Pb-210	L/kg(fw)	100	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(fw)	450	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-239	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-240	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Pu-241	L/kg(fw)	4000	CSA N288.1-14	Table A.25f	
Ra-223	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-224	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-225	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-226	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Ra-228	L/kg(fw)	1200	CSA N288.1-14	Table A.25f	
Sr-90	L/kg(fw)	370	CSA N288.1-14	Table A.25f	
Tc-99	L/kg(fw)	7.6	CSA N288.1-14	Table A.25f	
Th-227	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-228	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-229	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-230	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-231	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-232	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
Th-234	L/kg(fw)	2200	CSA N288.1-14	Table A.25f	
U-233	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-234	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-235	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-236	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	
U-238	L/kg(fw)	1100	CSA N288.1-14	Table A.25f	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.85E-04	ERICA 1.2.1	Database	Phytoplankton
Ac-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-07	ERICA 1.2.1	Database	Phytoplankton
Ag-108m	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	-1.00E+00			
Am-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.50E-05	ICRP 108 (2008)	Table C.21	seaweed value
Am-243	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.62E-04	ERICA 1.2.1	Database	Phytoplankton
Bi-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-04	ERICA 1.2.1	Database	Phytoplankton
C-14	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.17E-07	ICRP 108 (2008)	Table C.21	seaweed value
Ca-41	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.65E-08	ERICA 1.2.1	Database	Phytoplankton
Cl-36	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.38E-05	ICRP 108 (2008)	Table C.21	seaweed value
Cm-244	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.79E-07	ERICA 1.2.1	Database	Phytoplankton
Co-60	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.001417	ICRP 108 (2008)	Table C.21	seaweed value
Cs-137	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.29E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.67E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-154	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.08E-04	ICRP 108 (2008)	Table C.21	seaweed value
Eu-155	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.38E-05	ICRP 108 (2008)	Table C.21	seaweed value
Fe-55	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.79E-07	ERICA 1.2.1	Database	Phytoplankton
Gd-152	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	ERICA 1.2.1	Database	Phytoplankton
HTO	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.33E-09	ICRP 108 (2008)	Table C.21	seaweed value
I-129	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.25E-05	ICRP 108 (2008)	Table C.21	seaweed value
Nb-94	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.75E-04	ICRP 108 (2008)	Table C.21	seaweed value
Ni-59	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	8.03E-07	ERICA 1.2.1	Database	Phytoplankton
Ni-63	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.04E-08	ICRP 108 (2008)	Table C.21	seaweed value
Np-237	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.63E-05	ICRP 108 (2008)	Table C.21	seaweed value
Np-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.30E-04	ERICA 1.2.1	Database	Phytoplankton
OBT	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.85E-05	ERICA 1.2.1	Database	Phytoplankton
Pa-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.42E-04	ERICA 1.2.1	Database	Phytoplankton
Pb-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.66E-04	ERICA 1.2.1	Database	Phytoplankton
Po-210	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.95E-09	ERICA 1.2.1	Database	Phytoplankton
Pu-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.58E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-239	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.08E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-240	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.58E-07	ICRP 108 (2008)	Table C.21	seaweed value
Pu-241	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.29E-09	ICRP 108 (2008)	Table C.21	seaweed value
Ra-223	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.08E-04	ERICA 1.2.1	Database	Phytoplankton
Ra-224	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.44E-03	ERICA 1.2.1	Database	Phytoplankton
Ra-225	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.08E-03	ERICA 1.2.1	Database	Phytoplankton
Ra-226	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.13E-03	ICRP 108 (2008)	Table C.21	seaweed value
Ra-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	7.35E-04	ERICA 1.2.1	Database	Phytoplankton
Sr-90	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.83E-04	ICRP 108 (2008)	Table C.21	seaweed value
Tc-99	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.29E-06	ICRP 108 (2008)	Table C.21	seaweed value
Th-227	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	6.63E-05	ERICA 1.2.1	Database	Phytoplankton
Th-228	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.00E-03	ICRP 108 (2008)	Table C.21	seaweed value
Th-229	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	5.00E-05	ICRP 108 (2008)	Table C.21	seaweed value
Th-230	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.10E-06	ERICA 1.2.1	Database	Phytoplankton
Th-231	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	2.19E-05	ERICA 1.2.1	Database	Phytoplankton
Th-232	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.38E-07	ICRP 108 (2008)	Table C.21	seaweed value
Th-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	1.58E-04	ICRP 108 (2008)	Table C.21	seaweed value
U-233	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.13E-07	ICRP 108 (2008)	Table C.21	seaweed value
U-234	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	4.17E-07	ICRP 108 (2008)	Table C.21	seaweed value
U-235	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.58E-05	ICRP 108 (2008)	Table C.21	seaweed value
U-236	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	9.47E-07	ERICA 1.2.1	Database	Phytoplankton
U-238	(uGy/hr)/(Bq/kg(ww sediment) or Bq/L(water))	3.17E-07	ICRP 108 (2008)	Table C.21	seaweed value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15884	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	1.20E-05	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.05E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	6.18E-05	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.52E-06	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.46E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.03343	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	8.75E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	1.38E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	7.92E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	1.67E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	3.79E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	2.92E-06	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.21	seaweed; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	3.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	1.17E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	3.92E-06	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	1.20E-04	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.21	seaweed; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	8.89E-05	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.17E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.52E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.60E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.38E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.38E-01	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	2.58E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	4.58E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.37E-02	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.84E-01	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.028233	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	1.00E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02292	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	3.67E-04	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.02547	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025992	ERICA 1.2.1	Database	phytoplankton; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.21	seaweed; alpha component increased by 10x

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.25	CSA N288.1-14	cl. 7.7.4.2	DWap; value for freshwater both types of macrophytes
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl.7.7.4.5	
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 7.7.5.6	X7; value for terrestrial plants
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; dose eq'n N288.6 cl. 7.3.4.1.2
Fraction of time spent on the sediment surface	[]	0.5	Not in DRL Guidance	EcoMetrix suggestion	Riparian Plant
Fraction of time spent in the water column	[]	0.5	Not in DRL Guidance	EcoMetrix suggestion	Riparian Plant
Fraction of time spent on the water surface	[]	0	EcoMetrix Suggestion 2014		OFws; dose eq'n N288.6 cl. 7.3.4.1.2

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(dw)	165	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(dw)	165	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(dw)	90	CSA N288.1-14	Table G.2	value for sand
Am-241	L/kg(dw)	1000	CSA N288.1-14	Table G.2	value for sand
Am-243	L/kg(dw)	1000	CSA N288.1-14	Table G.2	value for sand
Bi-210	L/kg(dw)	45	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(dw)	5	CSA N288.1-14	Table G.2	value for sand
Ca-41	L/kg(dw)	22	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(dw)	2	CSA N288.1-14	Table G.2	value for sand
Cm-244	L/kg(dw)	4000	CSA N288.1-14	Table G.2	value for sand
Co-60	L/kg(dw)	640	CSA N288.1-14	Table G.2	value for sand
Cs-137	L/kg(dw)	530	CSA N288.1-14	Table G.2	value for sand
Eu-152	L/kg(dw)	123	CSA N288.1-14	Table G.2	value for sand
Eu-154	L/kg(dw)	123	CSA N288.1-14	Table G.2	value for sand
Eu-155	L/kg(dw)	123	CSA N288.1-14	Table G.2	value for sand
Fe-55	L/kg(dw)	320	CSA N288.1-14	Table G.2	value for sand
Gd-152	L/kg(dw)	99	CSA N288.1-14	Table G.2	value for sand
HTO	L/kg(dw)	0	CSA N288.1-14	Table G.2	value for sand
I-129	L/kg(dw)	7.6	CSA N288.1-14	Table G.2	value for sand
Nb-94	L/kg(dw)	170	CSA N288.1-14	Table G.2	value for sand
Ni-59	L/kg(dw)	140	CSA N288.1-14	Table G.2	value for sand
Ni-63	L/kg(dw)	140	CSA N288.1-14	Table G.2	value for sand
Np-237	L/kg(dw)	4	CSA N288.1-14	Table G.2	value for sand
Np-239	L/kg(dw)	4	CSA N288.1-14	Table G.2	value for sand
OBT	L/kg(dw)	0	Not Applicable		found in biological tissues
Pa-231	L/kg(dw)	540	CSA N288.1-14	Table G.2	value for sand
Pa-233	L/kg(dw)	540	CSA N288.1-14	Table G.2	value for sand
Pb-210	L/kg(dw)	130	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(dw)	125	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(dw)	400	CSA N288.1-14	Table G.2	value for sand
Pu-239	L/kg(dw)	400	CSA N288.1-14	Table G.2	value for sand
Pu-240	L/kg(dw)	400	CSA N288.1-14	Table G.2	value for sand
Pu-241	L/kg(dw)	400	CSA N288.1-14	Table G.2	value for sand
Ra-223	L/kg(dw)	1900	CSA N288.1-14	Table G.2	value for sand
Ra-224	L/kg(dw)	1900	CSA N288.1-14	Table G.2	value for sand
Ra-225	L/kg(dw)	1900	CSA N288.1-14	Table G.2	value for sand
Ra-226	L/kg(dw)	1900	CSA N288.1-14	Table G.2	value for sand
Ra-228	L/kg(dw)	1900	CSA N288.1-14	Table G.2	value for sand
Sr-90	L/kg(dw)	22	CSA N288.1-14	Table G.2	value for sand
Tc-99	L/kg(dw)	0.04	CSA N288.1-14	Table G.2	value for sand
Th-227	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-228	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-229	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-230	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-231	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-232	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
Th-234	L/kg(dw)	700	CSA N288.1-14	Table G.2	value for sand
U-233	L/kg(dw)	110	CSA N288.1-14	Table G.2	value for sand
U-234	L/kg(dw)	110	CSA N288.1-14	Table G.2	value for sand
U-235	L/kg(dw)	110	CSA N288.1-14	Table G.2	value for sand
U-236	L/kg(dw)	110	CSA N288.1-14	Table G.2	value for sand
U-238	L/kg(dw)	110	CSA N288.1-14	Table G.2	value for sand

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Bulk Density	kg(dw)/L	1.5	CSA N288.1-14	Table F.2	rhob; value for sand
Porosity	[]	0.2	CSA N288.1-14	Table F.2	n; average above and below water table
Stable Carbon In Soil Water	g-c/m3	1.2	CSA N288.1-14	cl. 6.5.5.2	X3spw_C; default value
HTO Ratio Soil Water To Air	(Bq/m3)/(Bq/m3)	0.3	CSA N288.1-14	cl. 6.5.4.3	RFsw; default value
Infiltration To Aquifer	m/s	4.75E-09	CSA N288.1-14	Table F.2	qgw_infil; 0.15m/a from Jensen et al., 1995

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	2.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	4.51E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.96E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	1.21E-08	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	2.07E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.60E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	3.15E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.81E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	6.42E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	1.27E-06	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.38E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	4.64E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	3.35E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.78E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	2.34E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.69E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	3.28E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	2.16E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	2.29E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	1.01E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	3.80E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	6.63E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	3.72E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	2.25E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	3.33E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.69E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	2.49E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.97E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	4.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.70E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	3.30E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	3.41E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	3.77E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.57E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	1.02E-10	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.70E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	5.49E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	9.09E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.85E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	7.01E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	6.32E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	3.31E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	1.05E-05	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	2.28E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	4.68E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	5.14E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.98E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.69E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	6.40E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	1.01E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	6.28E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.55E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	7.67E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	5.83E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	3.70E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	3.35E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	3.21E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	7.22E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	1.23E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	4.67E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	8.12E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	1.20E-06	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	3.71E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	5.11E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	5.44E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	3.07E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.37E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.62E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.55E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	1.08E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	1.29E-09	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	5.71E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	5.86E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	3.65E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	3.27E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	1.04E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.58E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	6.64E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	9.56E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	8.27E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.44E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.64E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	9.44E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	2.28E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	4.43E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	4.80E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	2.20E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	8.00E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	6.11E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	8.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	6.32E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.31E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	7.71E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.53E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	3.40E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	2.57E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	1.17E-11	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	2.47E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.77E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	1.16E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	5.92E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	1.08E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	6.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	9.77E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.59E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	5.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.42E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.38E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	9.78E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	4.76E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	7.85E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	2.41E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	6.38E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	2.07E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	4.77E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.96E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	2.39E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	3.24E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.77E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	7.59E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.35E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.39E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	4.89E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	1.05E-06	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	2.17E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	2.35E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	8.78E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	1.15E-08	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.95E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	3.64E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.85E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	7.05E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	3.83E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	2.31E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.71E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.40E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.60E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	2.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.76E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.93E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	1.16E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	2.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	3.32E-09	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/m3)	1.38E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	7.13E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	2.14E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.96E-10	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/m3)	6.15E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	5.82E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	2.51E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.65E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.59E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	1.03E-10	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	0.000028	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	0.00057	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.70E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	0.000073	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	0.000072	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	0.00000039	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	3.8E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	4.2E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	0.000000031	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	0.000062	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	0.000000042	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	8.8E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	0.00000011	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	0.00000016	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	0.000000026	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	1.9E-09	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	0.000021	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	1.05E-10	CSA N288.1-14	Table C1	
I-129	Sv/Bq	0.00000017	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	0.000000043	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	7.9E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	2.5E-09	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	0.000044	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	5.9E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	0.00022	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	0.000000015	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	0.000005	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	0.000015	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	0.000078	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	0.00008	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	0.00008	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	0.00000091	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	0.000028	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	0.000011	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	0.000024	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	0.000015	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	0.000015	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	0.00000015	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	0.000000017	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	0.000039	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	0.00016	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	0.00021	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	0.00004	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	2.4E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	0.000054	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	0.000000041	CSA N288.1-14	Table C1	
U-233	Sv/Bq	0.000015	CSA N288.1-14	Table C1	
U-234	Sv/Bq	0.000015	CSA N288.1-14	Table C1	
U-235	Sv/Bq	0.000013	CSA N288.1-14	Table C1	
U-236	Sv/Bq	0.000014	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	0.000012	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	4.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	3.30E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	3.70E-06	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	3.60E-06	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	1.50E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.40E-09	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	1.20E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	9.80E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	2.90E-06	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	5.40E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	2.10E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	1.60E-08	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	2.50E-08	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	4.30E-09	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	7.60E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	7.00E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	1.80E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	1.50E-08	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	6.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.60E-09	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	2.00E-06	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	8.90E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	1.30E-10	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	1.40E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	9.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	8.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	2.60E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.00E-06	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	4.20E-06	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	4.20E-06	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.60E-08	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	5.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	2.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	7.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	4.70E-06	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	3.03E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	2.30E-07	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	1.00E-08	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	3.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	3.70E-06	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	1.10E-05	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	4.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	3.90E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	4.60E-06	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	4.00E-08	CSA N288.1-14	Table C2	
U-233	Sv/Bq	3.80E-07	CSA N288.1-14	Table C2	
U-234	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
U-235	Sv/Bq	3.50E-07	CSA N288.1-14	Table C2	
U-236	Sv/Bq	3.50E-07	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	3.40E-07	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	770	DRL Guidance 2013	Table 4.17	I; mean, 0-1 year
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	0	DRL Guidance 2013		Drinks milk only
Soil Ingestion	kg(dw)/day	0.000038	DRL Guidance 2013	Table 4.18	Is; mean; 0.038 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000038	DRL Guidance 2013	Table 4.18	Is; mean; 0.038 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	0	DRL Guidance 2013		
Terrestrial Animal Ingestion	kg(fw)/a	360	DRL Guidance 2013		95th percentile for breast milk nursing infant
Aquatic Plant Ingestion	kg(fw)/a	0	DRL Guidance 2013	Table G20b	If; default, dulce, 6-12mo infant
Aquatic Animal Ingestion	kg(fw)/a	0	DRL Guidance 2013		
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw
Water Exposed Area	m2	0.44	DRL Guidance 2013	Table 4.20	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw '
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''
Pool Occupancy Factor For Groundwater	[]	0	CSA N288.1-14	cl. 6.16.1.3	Ofw''

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	1.89E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	3.47E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	9.34E-09	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	1.59E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	2.42E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.16E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	4.94E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	9.75E-07	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.06E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	3.57E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	2.58E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.37E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	1.80E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.30E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	2.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	1.66E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	1.76E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	7.77E-12	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	2.93E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	5.10E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	2.86E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	1.73E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	2.56E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	1.91E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	3.48E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.31E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	2.54E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	2.63E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	2.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.21E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	7.83E-11	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.31E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	4.22E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	6.99E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	5.39E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	4.86E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	2.55E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	9.42E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	8.11E-06	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	1.75E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	3.60E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	3.95E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.52E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.07E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	4.92E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	7.76E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	4.83E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.19E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	5.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	4.49E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	2.85E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	2.58E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	2.47E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	5.55E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	9.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	3.59E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	6.24E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	9.22E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	2.86E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	3.93E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	4.18E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	2.36E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.05E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.01E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.19E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	8.32E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	9.93E-10	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	4.39E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	4.51E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	2.81E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	2.52E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	7.99E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	5.11E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	7.35E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	6.36E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.11E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.03E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	7.26E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	1.75E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	3.41E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	3.69E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	1.69E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	6.15E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	4.70E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	6.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	4.86E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	5.93E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.18E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	2.61E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	1.98E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	8.96E-12	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	1.90E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.36E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	8.94E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	4.55E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	8.33E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	5.33E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	7.52E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	4.56E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.09E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	9.47E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.06E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	7.52E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	3.66E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	6.04E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	1.85E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	4.91E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	1.59E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	3.67E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.27E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	1.84E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	2.49E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.13E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	5.84E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.04E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.07E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	3.76E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	8.09E-07	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	1.67E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	1.81E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	6.75E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	8.87E-09	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.27E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	2.80E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.19E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	5.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	2.95E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	1.78E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.31E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.08E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.00E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	1.92E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.35E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.49E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	8.96E-09	CSA N288.1-14	Table C3	
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	1.54E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	2.55E-09	CSA N288.1-14	Table C3	
Th-229	(Sv/a)/(Bq/m3)	1.06E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	5.49E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	1.65E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.28E-10	CSA N288.1-14	Table C3	
Th-234	(Sv/a)/(Bq/m3)	4.73E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	4.48E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	1.93E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.04E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.22E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	7.89E-11	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	7.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	2.20E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	7.40E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	4.20E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	4.10E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	9.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.20E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	9.50E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	7.30E-09	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	2.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.00E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	4.60E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	4.20E-08	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	5.30E-08	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	6.90E-09	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	3.80E-10	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	8.00E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	3.00E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	9.60E-08	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	1.10E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	1.30E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	4.80E-10	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	2.30E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	9.30E-10	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	1.40E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	3.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	3.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.60E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	9.00E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	7.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	3.00E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	6.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	3.50E-06	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	2.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	3.60E-08	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	4.00E-09	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	1.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	7.10E-05	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	1.40E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	3.30E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.50E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	7.70E-09	CSA N288.1-14	Table C1	
U-233	Sv/Bq	3.60E-06	CSA N288.1-14	Table C1	
U-234	Sv/Bq	3.50E-06	CSA N288.1-14	Table C1	
U-235	Sv/Bq	3.10E-06	CSA N288.1-14	Table C1	
U-236	Sv/Bq	3.20E-06	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	2.90E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	2.40E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	2.00E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	2.00E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	1.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	5.80E-10	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	1.90E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	9.30E-10	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	1.20E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.30E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	1.40E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	2.00E-09	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	3.20E-10	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	3.30E-10	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	4.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	2.00E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	1.70E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	6.30E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.50E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	8.00E-10	CSA N288.1-14	Table C2	
OBT	Sv/Bq	4.60E-11	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	7.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	8.70E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	6.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	2.30E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	2.50E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	2.50E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	4.80E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	1.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	6.50E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	9.90E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	2.80E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	6.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	2.80E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	6.40E-10	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	8.80E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	7.20E-08	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	4.90E-07	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	2.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	3.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.30E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
U-233	Sv/Bq	5.10E-08	CSA N288.1-14	Table C2	
U-234	Sv/Bq	4.90E-08	CSA N288.1-14	Table C2	
U-235	Sv/Bq	4.70E-08	CSA N288.1-14	Table C2	
U-236	Sv/Bq	4.70E-08	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	4.50E-08	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	5950	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	379.6	CSA N288.1-14	Table 21	Iw; mean; 1.04 L/d
Soil Ingestion	kg(dw)/day	0.000004	CSA N288.1-14	Table 20	Is; mean; 0.004 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000004	CSA N288.1-14	Table 20	Is; mean; 0.004 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	440.044	DRL Guidance 2013	Table G20b	If; default, adult male value,
Terrestrial Animal Ingestion	kg(fw)/a	255.49	DRL Guidance 2013	Table G20b	If; default, adult male value, includes milk
Aquatic Plant Ingestion	kg(fw)/a	2.23	DRL Guidance 2013	Table G20b	If; default, adult male value, dulce
Aquatic Animal Ingestion	kg(fw)/a	6.862	DRL Guidance 2013	Table G20b	If; default, adult male value, fish only
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw - modified to 2 months instead of 4
Water Exposed Area	m2	2.19	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0.03125	CSA N288.1-14	cl. 7.6.1.2	OFw'' - modified to 9 months instead of 8
Pool Occupancy Factor For Groundwater	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw'' - modified to 3 months instead of 4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	1.89E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	3.47E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	9.34E-09	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	1.59E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	2.42E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.16E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	4.94E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	9.75E-07	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.06E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	3.57E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	2.58E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.37E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	1.80E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.30E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	2.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	1.66E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	1.76E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	7.77E-12	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	2.93E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	5.10E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	2.86E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	1.73E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	2.56E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	1.91E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	3.48E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.31E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	2.54E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	2.63E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	2.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.21E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	7.83E-11	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.31E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	4.22E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Contaminant	**Unit**	**Value**	**Reference**	**Locations in Reference**	**Note**
Ac-225	(Sv/a)/(Bq/L)	6.99E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	5.39E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	4.86E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	2.55E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	9.42E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	8.11E-06	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	1.75E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	3.60E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	3.95E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.52E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.07E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	4.92E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	7.76E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	4.83E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.19E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	5.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	4.49E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	2.85E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	2.58E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	2.47E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	5.55E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	9.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	3.59E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	6.24E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	9.22E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	2.86E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	3.93E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	4.18E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	2.36E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.05E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.01E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.19E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	8.32E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	9.93E-10	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	4.39E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	4.51E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	2.81E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	2.52E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	7.99E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	5.11E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	7.35E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	6.36E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.11E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.03E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	7.26E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	1.75E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	3.41E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	3.69E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	1.69E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	6.15E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	4.70E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	6.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	4.86E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	5.93E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.18E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	2.61E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	1.98E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	8.96E-12	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	1.90E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.36E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	8.94E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	4.55E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	8.33E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	5.33E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	7.52E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	4.56E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.09E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	9.47E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.06E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	7.52E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	3.66E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	6.04E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	1.85E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	4.91E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	1.59E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	3.67E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.27E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	1.84E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	2.49E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.13E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	5.84E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.04E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.07E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	3.76E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	8.09E-07	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	1.67E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	1.81E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	6.75E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	8.87E-09	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.27E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	2.80E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.19E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	5.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	2.95E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	1.78E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.31E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.08E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.00E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	1.92E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.35E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.49E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	8.96E-09	CSA N288.1-14	Table C3	
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	1.54E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	2.55E-09	CSA N288.1-14	Table C3	
Th-229	(Sv/a)/(Bq/m3)	1.06E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	5.49E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	1.65E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.28E-10	CSA N288.1-14	Table C3	
Th-234	(Sv/a)/(Bq/m3)	4.73E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	4.48E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	1.93E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.04E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.22E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	7.89E-11	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	7.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	2.20E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	7.40E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	4.20E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	4.10E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	9.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.20E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	9.50E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	7.30E-09	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	2.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.00E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	4.60E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	4.20E-08	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	5.30E-08	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	6.90E-09	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	3.80E-10	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	8.00E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	3.00E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	9.60E-08	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	1.10E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	1.30E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	4.80E-10	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	2.30E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	9.30E-10	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	1.40E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	3.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	3.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.60E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	9.00E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	7.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	3.00E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	6.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	3.50E-06	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	2.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	3.60E-08	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	4.00E-09	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	1.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	7.10E-05	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	1.40E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	3.30E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.50E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	7.70E-09	CSA N288.1-14	Table C1	
U-233	Sv/Bq	3.60E-06	CSA N288.1-14	Table C1	
U-234	Sv/Bq	3.50E-06	CSA N288.1-14	Table C1	
U-235	Sv/Bq	3.10E-06	CSA N288.1-14	Table C1	
U-236	Sv/Bq	3.20E-06	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	2.90E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	2.40E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	2.00E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	2.00E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	1.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	5.80E-10	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	1.90E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	9.30E-10	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	1.20E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.30E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	1.40E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	2.00E-09	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	3.20E-10	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	3.30E-10	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	4.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	2.00E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	1.70E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	6.30E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.50E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	8.00E-10	CSA N288.1-14	Table C2	
OBT	Sv/Bq	4.60E-11	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	7.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	8.70E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	6.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	2.30E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	2.50E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	2.50E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	4.80E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	1.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	6.50E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	9.90E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	2.80E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	6.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	2.80E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	6.40E-10	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	8.80E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	7.20E-08	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	4.90E-07	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	2.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	3.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.30E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
U-233	Sv/Bq	5.10E-08	CSA N288.1-14	Table C2	
U-234	Sv/Bq	4.90E-08	CSA N288.1-14	Table C2	
U-235	Sv/Bq	4.70E-08	CSA N288.1-14	Table C2	
U-236	Sv/Bq	4.70E-08	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	4.50E-08	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	5950	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	0.0119	Not in DRL Guidance	EcoMetrix Suggestion	fo; the harvester spends 2 hours per week in each area, which is 1.19% fo their time
Water Ingestion	L/a	379.6	CSA N288.1-14	Table 21	Iw; mean; 1.04 L/d
Soil Ingestion	kg(dw)/day	0.000004	CSA N288.1-14	Table 20	Is; mean; 0.004 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000004	CSA N288.1-14	Table 20	Is; mean; 0.004 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	24.227	CNL 2018		
Terrestrial Animal Ingestion	kg(fw)/a	9.425	CNL 2018		
Aquatic Plant Ingestion	kg(fw)/a	0	CNL 2018		
Aquatic Animal Ingestion	kg(fw)/a	11.654	CNL 2018		
Outdoor Occupancy Factor	[]	1	Not in DRL Guidance	EcoMetrix suggestion	fu; the harvester spends all of its time outdoors
Water Occupancy Factor	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw - modified to 3 months instead of 4
Water Exposed Area	m2	2.19	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	52	Not in DRL Guidance	EcoMetrix Suggestio	EFs; harvester spends one day per week on site
Sediment Exposure Frequency	d/a	52	Not in DRL Guidance	EcoMetrix Suggestion	EFsed; the harvester spends 1 day every week harvesting
Shoreline Occupancy Factor	[]	0.0119	Not in DRL Guidance	EcoMetrix Suggestion	(OF)s; the harvester spends 2 hours per week in each area, all outdoors, which is 1.19% of their time
Pool Occupancy Factor For Surface Water	[]	0.03125	CSA N288.1-14	cl. 7.6.1.2	OFw'' - modified to 9 months instead of 8
Pool Occupancy Factor For Groundwater	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw'' - modified to 3 months instead of 4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	1.89E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	3.47E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	9.34E-09	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	1.59E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	2.42E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.16E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	4.94E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	9.75E-07	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.06E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	3.57E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	2.58E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.37E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	1.80E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.30E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	2.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	1.66E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	1.76E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	7.77E-12	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	2.93E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	5.10E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	2.86E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	1.73E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	2.56E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	1.91E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	3.48E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.31E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	2.54E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	2.63E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	2.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.21E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	7.83E-11	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.31E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	4.22E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	6.99E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	5.39E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	4.86E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	2.55E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	9.42E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	8.11E-06	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	1.75E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	3.60E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	3.95E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.52E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.07E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	4.92E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	7.76E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	4.83E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.19E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	5.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	4.49E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	2.85E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	2.58E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	2.47E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	5.55E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	9.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	3.59E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	6.24E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	9.22E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	2.86E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	3.93E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	4.18E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	2.36E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.05E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.01E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.19E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	8.32E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	9.93E-10	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	4.39E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	4.51E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	2.81E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	2.52E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	7.99E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	5.11E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	7.35E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	6.36E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.11E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.03E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	7.26E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	1.75E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	3.41E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	3.69E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	1.69E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	6.15E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	4.70E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	6.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	4.86E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	5.93E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.18E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	2.61E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	1.98E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	8.96E-12	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	1.90E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.36E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	8.94E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	4.55E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	8.33E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	5.33E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	7.52E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	4.56E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.09E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	9.47E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.06E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	7.52E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	3.66E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	6.04E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	1.85E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	4.91E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	1.59E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	3.67E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.27E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	1.84E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	2.49E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.13E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	5.84E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.04E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.07E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	3.76E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	8.09E-07	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	1.67E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	1.81E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	6.75E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	8.87E-09	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.27E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	2.80E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.19E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	5.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	2.95E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	1.78E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.31E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.08E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.00E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	1.92E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.35E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.49E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	8.96E-09	CSA N288.1-14	Table C3	
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	1.54E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	2.55E-09	CSA N288.1-14	Table C3	
Th-229	(Sv/a)/(Bq/m3)	1.06E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	5.49E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	1.65E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.28E-10	CSA N288.1-14	Table C3	
Th-234	(Sv/a)/(Bq/m3)	4.73E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	4.48E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	1.93E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.04E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.22E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	7.89E-11	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	1.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	2.60E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	1.30E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.80E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	1.70E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	1.00E-08	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	2.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.50E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	3.70E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	4.90E-08	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	6.50E-08	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	9.20E-09	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	6.20E-10	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	8.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	3.75E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	1.70E-07	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	1.60E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	2.10E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	7.00E-10	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	2.20E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	1.40E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	1.50E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	4.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.50E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	4.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.40E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	4.80E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	4.80E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	8.30E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	9.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	3.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	8.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	4.90E-06	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	4.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	5.10E-08	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	5.70E-09	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	1.40E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	5.50E-05	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	8.70E-05	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	1.60E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	5.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.60E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	1.10E-08	CSA N288.1-14	Table C1	
U-233	Sv/Bq	4.90E-06	CSA N288.1-14	Table C1	
U-234	Sv/Bq	4.80E-06	CSA N288.1-14	Table C1	
U-235	Sv/Bq	4.30E-06	CSA N288.1-14	Table C1	
U-236	Sv/Bq	4.50E-06	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	4.00E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	5.40E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	1.50E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	4.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	2.20E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	2.20E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	2.90E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	8.00E-10	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	4.80E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	1.90E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	1.40E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.10E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.00E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	2.60E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	4.10E-09	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	6.80E-10	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	1.10E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	5.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	2.50E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	1.90E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	1.10E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	2.80E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	1.70E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	6.30E-11	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	9.20E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	1.90E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	2.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	2.40E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	2.70E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	2.70E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.10E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	4.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	2.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	5.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	8.00E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	3.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	6.00E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	1.30E-09	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	2.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	1.50E-07	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	6.20E-07	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	2.40E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	7.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.90E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	7.40E-09	CSA N288.1-14	Table C2	
U-233	Sv/Bq	7.80E-08	CSA N288.1-14	Table C2	
U-234	Sv/Bq	7.40E-08	CSA N288.1-14	Table C2	
U-235	Sv/Bq	7.10E-08	CSA N288.1-14	Table C2	
U-236	Sv/Bq	7.00E-08	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	6.80E-08	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	5660	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	151.11	CSA N288.1-14	Table 21	Iw; mean; 0.414 L/d
Soil Ingestion	kg(dw)/day	0.000055	CSA N288.1-14	Table 20	Is; mean; 0.05 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000055	CSA N288.1-14	Table 20	Is; mean; 0.05 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	331.1	DRL Guidance 2013	Table G20b	If; default,
Terrestrial Animal Ingestion	kg(fw)/a	286.25	DRL Guidance 2013	Table G20b	If; default, includes milk
Aquatic Plant Ingestion	kg(fw)/a	1.79	DRL Guidance 2013	Table G20b	If; default, dulce
Aquatic Animal Ingestion	kg(fw)/a	4.82	DRL Guidance 2013	Table G20b	If; default, fish only
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw - modified to 3 months instead of 4
Water Exposed Area	m2	1.46	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0.03125	CSA N288.1-14	cl. 7.6.1.2	OFw'' - modified to 9 months instead of 8
Pool Occupancy Factor For Groundwater	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw'' - modified to 3 months instead of 4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	1.89E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	3.47E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	9.34E-09	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	1.59E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	2.42E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.16E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	4.94E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	9.75E-07	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.06E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	3.57E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	2.58E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.37E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	1.80E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.30E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	2.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	1.66E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	1.76E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	7.77E-12	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	2.93E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	5.10E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	2.86E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	1.73E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	2.56E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	1.91E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.51E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	3.48E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.31E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	2.54E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	2.63E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	2.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.14E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.21E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	7.83E-11	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.31E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	4.22E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.16E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	6.99E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	5.39E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	4.86E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	2.55E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	9.42E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	8.11E-06	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	1.75E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	3.60E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	3.95E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.52E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.07E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	4.92E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	7.76E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	4.83E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.19E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	5.90E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	4.49E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	2.85E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	2.58E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	2.47E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	2.52E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	5.55E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	9.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	3.59E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	6.24E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	9.22E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	2.86E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	3.93E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.(corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	4.18E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	2.36E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.05E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.01E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.19E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	8.32E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	9.93E-10	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	4.39E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	4.51E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	2.81E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	2.52E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	7.99E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	5.11E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	7.35E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	6.36E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.11E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.03E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	7.26E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	1.75E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	3.41E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	3.69E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	1.69E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	6.15E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	4.70E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	6.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	4.86E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	5.93E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.18E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	2.61E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	1.98E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	8.96E-12	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	1.90E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.36E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	8.94E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	4.55E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	8.33E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	5.33E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	7.52E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	4.56E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.09E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	9.47E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.06E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	7.52E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	3.66E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	6.04E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	1.85E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	4.91E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	1.59E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	3.67E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.27E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	1.84E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	2.49E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.13E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	5.84E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.04E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.07E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	3.76E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	8.09E-07	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	1.67E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	1.81E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	6.75E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	8.87E-09	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.27E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	2.80E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.19E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	5.42E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	2.95E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	1.78E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.31E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.10E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.08E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.00E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	1.92E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.35E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.49E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	8.96E-09	CSA N288.1-14	Table C3	
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	1.54E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	2.55E-09	CSA N288.1-14	Table C3	
Th-229	(Sv/a)/(Bq/m3)	1.06E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	5.49E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	1.65E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.28E-10	CSA N288.1-14	Table C3	
Th-234	(Sv/a)/(Bq/m3)	4.73E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	4.48E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	1.93E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.04E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.22E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	7.89E-11	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	1.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	2.60E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	1.30E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.80E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	1.70E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	1.00E-08	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	2.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.50E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	3.70E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	4.90E-08	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	6.50E-08	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	9.20E-09	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	6.20E-10	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	8.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	3.75E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	1.70E-07	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	1.60E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	2.10E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	7.00E-10	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	2.20E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	1.40E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	1.50E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	4.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.50E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	4.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.40E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	4.80E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	4.80E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	8.30E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	9.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	3.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	8.40E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	4.90E-06	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	4.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	5.10E-08	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	5.70E-09	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	1.40E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	5.50E-05	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	8.70E-05	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	1.60E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	5.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.60E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	1.10E-08	CSA N288.1-14	Table C1	
U-233	Sv/Bq	4.90E-06	CSA N288.1-14	Table C1	
U-234	Sv/Bq	4.80E-06	CSA N288.1-14	Table C1	
U-235	Sv/Bq	4.30E-06	CSA N288.1-14	Table C1	
U-236	Sv/Bq	4.50E-06	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	4.00E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	5.40E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	1.50E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	4.30E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	Sv/Bq	2.20E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	2.20E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	2.90E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	8.00E-10	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	4.80E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	1.90E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	1.40E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	1.10E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.00E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	2.60E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	4.10E-09	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	6.80E-10	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	1.10E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	5.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	2.50E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	1.90E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	3.40E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	1.10E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	2.80E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	1.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	1.70E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	6.30E-11	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	9.20E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	1.90E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	1.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	2.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	2.40E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	2.70E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	2.70E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.10E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	4.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	2.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	5.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	8.00E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	3.90E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	6.00E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	1.30E-09	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	2.30E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	1.50E-07	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	6.20E-07	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	2.40E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	7.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	2.90E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	7.40E-09	CSA N288.1-14	Table C2	
U-233	Sv/Bq	7.80E-08	CSA N288.1-14	Table C2	
U-234	Sv/Bq	7.40E-08	CSA N288.1-14	Table C2	
U-235	Sv/Bq	7.10E-08	CSA N288.1-14	Table C2	
U-236	Sv/Bq	7.00E-08	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	6.80E-08	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	5660	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	0.0119	Not in DRL Guidance	EcoMetrix Suggestion	fo; the harvester spends 2 hours per week in each area, which is 1.19% of their time
Water Ingestion	L/a	151.11	CSA N288.1-14	Table 21	Iw; mean; 0.414 L/d
Soil Ingestion	kg(dw)/day	0.000055	CSA N288.1-14	Table 20	Is;mean; 0.055 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000055	CSA N288.1-14	Table 20	Is; mean; 0.05 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	18.23	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Terrestrial Animal Ingestion	kg(fw)/a	4.217	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Aquatic Plant Ingestion	kg(fw)/a	0	CNL 2018		
Aquatic Animal Ingestion	kg(fw)/a	8.186	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Outdoor Occupancy Factor	[]	1	Not in DRL Guidance	EcoMetrix Assumption	fu; the harvester spends all of its time outdoors
Water Occupancy Factor	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw - modified to 3 months instead of 4
Water Exposed Area	m2	1.46	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	52	Not in DRL Guidance	EcoMetrix Suggestion	EFsed; the harvest spnds 1 day per week harvesting
Shoreline Occupancy Factor	[]	0.0119	Not in DRL Guidance	EcoMetrix suggestion	(OF)s; the harvester spends 2 hours per week in each area, all outdoors, which is 1.19% of their time
Pool Occupancy Factor For Surface Water	[]	0.03125	CSA N288.1-14	cl. 7.6.1.2	OFw'' - modified to 9 months instead of 8
Pool Occupancy Factor For Groundwater	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw'' - modified to 3 months instead of 4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	2.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	4.51E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.96E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	1.21E-08	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	2.07E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.60E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	3.15E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.81E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	6.42E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	1.27E-06	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.38E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	4.64E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	3.35E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.78E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	2.34E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.69E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	3.28E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	2.16E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	2.29E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	1.01E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	3.80E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	6.63E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	3.72E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	2.25E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	3.33E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.69E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	2.49E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.97E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	4.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.70E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	3.30E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	3.41E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	3.77E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.57E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	1.02E-10	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.70E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	5.49E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	9.09E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.85E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	7.01E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	6.32E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	3.31E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	1.05E-05	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	2.28E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	4.68E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	5.14E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.98E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.69E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	6.40E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	1.01E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	6.28E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.55E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	7.67E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	5.83E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	3.70E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	3.35E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	3.21E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	7.22E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	1.23E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	4.67E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	8.12E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	1.20E-06	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	3.71E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	5.11E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	5.44E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	3.07E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.37E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.62E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.55E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	1.08E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	1.29E-09	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	5.71E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	5.86E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	3.65E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	3.27E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	1.04E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.58E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	6.64E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	9.56E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	8.27E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.44E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.64E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	9.44E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	2.28E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	4.43E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	4.80E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	2.20E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	8.00E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	6.11E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	8.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	6.32E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.31E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	7.71E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.53E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	3.40E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	2.57E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	1.17E-11	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	2.47E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.77E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	1.16E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	5.92E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	1.08E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	6.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	9.77E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.59E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	5.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.42E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.38E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	9.78E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	4.76E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	7.85E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	2.41E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	6.38E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	2.07E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	4.77E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.96E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	2.39E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	3.24E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.77E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	7.59E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.35E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.39E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	4.89E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	1.05E-06	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	2.17E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	2.35E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	8.78E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	1.15E-08	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.95E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	3.64E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.85E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	7.05E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	3.83E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	2.31E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.71E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.40E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.60E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	2.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.76E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.93E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	1.16E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	2.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	3.32E-09	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/m3)	1.38E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	7.13E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	2.14E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.96E-10	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/m3)	6.15E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	5.82E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	2.51E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.65E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.59E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	1.03E-10	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	5.50E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.70E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	6.90E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	6.80E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	3.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	3.80E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	2.60E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	2.60E-08	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	5.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	3.40E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	5.40E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	1.00E-07	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	1.50E-07	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	2.30E-08	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	1.40E-09	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	1.90E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	8.00E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	2.00E-07	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	3.70E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	6.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.90E-09	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	4.20E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	2.30E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	1.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	1.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	7.40E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	9.70E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	8.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.80E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	1.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	1.10E-07	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	1.30E-08	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	3.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	1.30E-04	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	1.90E-04	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	3.50E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	1.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	3.10E-08	CSA N288.1-14	Table C1	
U-233	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-234	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-235	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	
U-236	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	9.40E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	1.80E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	3.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	3.70E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	9.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.60E-09	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	5.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	6.30E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	2.90E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	2.70E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	7.40E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	2.20E-09	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	2.40E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	1.20E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	5.30E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	2.20E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	9.70E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	3.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	8.40E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	2.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	5.70E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	1.30E-10	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	6.20E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	8.80E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.00E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.70E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	6.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	9.60E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	5.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	7.30E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	4.80E-09	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	7.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	1.00E-06	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	4.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	2.50E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	4.50E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	2.50E-08	CSA N288.1-14	Table C2	
U-233	Sv/Bq	1.40E-07	CSA N288.1-14	Table C2	
U-234	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-235	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-236	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	1.20E-07	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	1830	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	98.915	CSA N288.1-14	Table 21	Iw; mean; 0.271 L/d
Soil Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	144.54	DRL Guidance 2013	Table G20b	If; default
Terrestrial Animal Ingestion	kg(fw)/a	262.28	DRL Guidance 2013	Table G20b	If; default, includes milk
Aquatic Plant Ingestion	kg(fw)/a	0.803	DRL Guidance 2013	Table G20b	If; default, dulce
Aquatic Animal Ingestion	kg(fw)/a	1.679	DRL Guidance 2013	Table G20b	If; default, fish only
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw
Water Exposed Area	m2	0.72	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''
Pool Occupancy Factor For Groundwater	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	2.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	4.51E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.96E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	1.21E-08	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	2.07E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.60E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	3.15E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.81E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	6.42E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	1.27E-06	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.38E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	4.64E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	3.35E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.78E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	2.34E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.69E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	3.28E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	2.16E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	2.29E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	1.01E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	3.80E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	6.63E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	3.72E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	2.25E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	3.33E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.69E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	2.49E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.97E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	4.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.70E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	3.30E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	3.41E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	3.77E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.57E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	1.02E-10	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.70E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	5.49E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	9.09E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.85E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	7.01E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	6.32E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	3.31E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	1.05E-05	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	2.28E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	4.68E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	5.14E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.98E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.69E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	6.40E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	1.01E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	6.28E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.55E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	7.67E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	5.83E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	3.70E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	3.35E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	3.21E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	7.22E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	1.23E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	4.67E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	8.12E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	1.20E-06	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	3.71E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	5.11E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	5.44E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	3.07E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.37E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.62E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.55E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	1.08E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	1.29E-09	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	5.71E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	5.86E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	3.65E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	3.27E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	1.04E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.58E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	6.64E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	9.56E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	8.27E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.44E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.64E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	9.44E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	2.28E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	4.43E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	4.80E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	2.20E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	8.00E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	6.11E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	8.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	6.32E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.31E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	7.71E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.53E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	3.40E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	2.57E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	1.17E-11	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	2.47E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.77E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	1.16E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	5.92E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	1.08E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	6.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	9.77E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.59E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	5.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.42E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.38E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	9.78E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	4.76E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	7.85E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	2.41E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	6.38E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	2.07E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	4.77E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.96E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	2.39E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	3.24E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.77E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	7.59E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.35E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.39E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	4.89E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	1.05E-06	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	2.17E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	2.35E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	8.78E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	1.15E-08	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.95E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	3.64E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.85E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	7.05E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	3.83E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	2.31E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.71E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.40E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.60E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	2.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.76E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.93E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	1.16E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	2.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	3.32E-09	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/m3)	1.38E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	7.13E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	2.14E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.96E-10	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/m3)	6.15E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	5.82E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	2.51E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.65E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.59E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	1.03E-10	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	5.50E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.70E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	6.90E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	6.80E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	3.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	3.80E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	2.60E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	2.60E-08	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	5.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	3.40E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	5.40E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	1.00E-07	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	1.50E-07	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	2.30E-08	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	1.40E-09	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	1.90E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	8.00E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	2.00E-07	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	3.70E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	6.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.90E-09	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	4.20E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	2.30E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	1.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	1.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	7.40E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	9.70E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	8.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.80E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	1.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	1.10E-07	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	1.30E-08	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	3.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	1.30E-04	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	1.90E-04	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	3.50E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	1.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	3.10E-08	CSA N288.1-14	Table C1	
U-233	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-234	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-235	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	
U-236	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	9.40E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	1.80E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	3.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	3.70E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	9.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.60E-09	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	5.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	6.30E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	2.90E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	2.70E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	7.40E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	2.20E-09	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	2.40E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	1.20E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	5.30E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	2.20E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	9.70E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	3.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	8.40E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	2.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	5.70E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	1.30E-10	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	6.20E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	8.80E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.00E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.70E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	6.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	9.60E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	5.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	7.30E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	4.80E-09	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	7.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	1.00E-06	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	4.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	2.50E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	4.50E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	2.50E-08	CSA N288.1-14	Table C2	
U-233	Sv/Bq	1.40E-07	CSA N288.1-14	Table C2	
U-234	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-235	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-236	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	1.20E-07	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	1830	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	98.915	CSA N288.1-14	Table 21	Iw; mean; .271 L/d
Soil Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	144.54	DRL Guidance 2013	Table G20b	If; default
Terrestrial Animal Ingestion	kg(fw)/a	19.56	DRL Guidance 2013	Table G20b	If; default, excludes milk
Aquatic Plant Ingestion	kg(fw)/a	0.803	DRL Guidance 2013	Table G20b	If; default, dulce
Aquatic Animal Ingestion	kg(fw)/a	1.679	DRL Guidance 2013	Table G20b	If; default, fish only
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw
Water Exposed Area	m2	0.72	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''
Pool Occupancy Factor For Groundwater	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	2.46E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	4.51E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.96E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	1.21E-08	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	2.07E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	1.60E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	2.78E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	4.90E-10	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	3.15E-11	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	2.81E-06	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	6.42E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	1.27E-06	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	1.38E-06	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	4.64E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	3.35E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	1.78E-06	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	2.34E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	1.69E-07	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0.00E+00	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	3.28E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	2.16E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	2.29E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	1.01E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	3.80E-11	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	6.63E-11	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	3.72E-11	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	2.25E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	3.33E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	1.69E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	2.49E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	1.97E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	8.94E-09	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	2.49E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	4.52E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	1.70E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	3.30E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	3.41E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	3.77E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	2.78E-06	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.57E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	1.02E-10	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	1.70E-07	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	5.49E-11	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	2.81E-08	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	9.09E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	1.85E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	7.01E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	6.32E-08	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	3.31E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	1.22E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	9.09E-11	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	6.15E-09	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	1.05E-05	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	2.28E-06	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	4.68E-06	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	5.14E-06	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	1.98E-07	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	2.69E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	6.40E-06	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	1.01E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	6.28E-07	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0.00E+00	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.55E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	7.67E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	5.83E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	3.70E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	3.35E-10	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	3.21E-10	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	3.28E-10	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	7.22E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	1.23E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	4.67E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	8.12E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	1.20E-06	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	3.71E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	1.06E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.88E-10	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	5.11E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	5.44E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	3.07E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	1.37E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	2.62E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	1.55E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	1.08E-07	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	1.29E-09	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	5.71E-10	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	5.86E-07	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	3.65E-10	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	3.27E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	1.04E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	1.58E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	6.64E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	9.56E-10	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	8.27E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	1.44E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	4.01E-13	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.53E-10	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.64E-11	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	9.44E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	2.28E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	4.43E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	4.80E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	2.20E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	8.00E-10	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	6.11E-08	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	8.68E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	6.32E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0.00E+00	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	1.31E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	7.71E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.53E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	3.40E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	2.57E-11	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	1.17E-11	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	2.47E-11	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	1.77E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	1.16E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	5.92E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	1.08E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	6.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	9.77E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	3.52E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	2.04E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	1.59E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	5.93E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	1.42E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	1.23E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	1.38E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	9.78E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	4.76E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	7.85E-11	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	2.41E-11	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	6.38E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	2.07E-11	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	4.77E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.96E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	2.39E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	3.24E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	2.77E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	7.59E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	1.35E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	8.21E-11	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	5.23E-09	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.39E-10	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	4.89E-06	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	1.05E-06	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	2.17E-06	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	2.35E-06	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	8.78E-08	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	1.15E-08	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	2.95E-06	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	3.64E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	2.85E-07	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0.00E+00	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	7.05E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	3.83E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	2.31E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.71E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	1.43E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.40E-10	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	2.60E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	2.50E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	1.76E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	1.93E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	1.16E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/m3)	0.00E+00	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	2.81E-08	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	9.06E-10	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	2.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	3.32E-09	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/m3)	1.38E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	7.13E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	2.14E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	2.96E-10	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/m3)	6.15E-08	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	5.82E-10	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	2.51E-10	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	2.65E-07	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.59E-10	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	1.03E-10	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	5.50E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	2.70E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	6.90E-05	CSA N288.1-14	Table C1	
Am-243	Sv/Bq	6.80E-05	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	3.00E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	3.80E-11	CSA N288.1-14	Table C1	
Ca-41	Sv/Bq	2.60E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	2.60E-08	CSA N288.1-14	Table C1	
Cm-244	Sv/Bq	5.70E-05	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	3.40E-08	CSA N288.1-14	Table C1	
Cs-137	Sv/Bq	5.40E-09	CSA N288.1-14	Table C1	
Eu-152	Sv/Bq	1.00E-07	CSA N288.1-14	Table C1	
Eu-154	Sv/Bq	1.50E-07	CSA N288.1-14	Table C1	
Eu-155	Sv/Bq	2.30E-08	CSA N288.1-14	Table C1	
Fe-55	Sv/Bq	1.40E-09	CSA N288.1-14	Table C1	
Gd-152	Sv/Bq	1.90E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	8.00E-11	CSA N288.1-14	Table C1	
I-129	Sv/Bq	2.00E-07	CSA N288.1-14	Table C1	
Nb-94	Sv/Bq	3.70E-08	CSA N288.1-14	Table C1	
Ni-59	Sv/Bq	6.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	1.90E-09	CSA N288.1-14	Table C1	
Np-237	Sv/Bq	4.00E-05	CSA N288.1-14	Table C1	
Np-239	Sv/Bq	4.20E-09	CSA N288.1-14	Table C1	
OBT	Sv/Bq	0.00E+00	CSA N288.1-14	Table C1	not in air
Pa-231	Sv/Bq	2.30E-04	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	1.10E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	1.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	7.40E-05	CSA N288.1-14	Table C1	
Pu-239	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-240	Sv/Bq	7.70E-05	CSA N288.1-14	Table C1	
Pu-241	Sv/Bq	9.70E-07	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	2.10E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	8.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.80E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
Ra-228	Sv/Bq	1.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	1.10E-07	CSA N288.1-14	Table C1	
Tc-99	Sv/Bq	1.30E-08	CSA N288.1-14	Table C1	
Th-227	Sv/Bq	3.00E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	1.30E-04	CSA N288.1-14	Table C1	
Th-229	Sv/Bq	1.90E-04	CSA N288.1-14	Table C1	
Th-230	Sv/Bq	3.50E-05	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	1.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	5.00E-05	CSA N288.1-14	Table C1	
Th-234	Sv/Bq	3.10E-08	CSA N288.1-14	Table C1	
U-233	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-234	Sv/Bq	1.10E-05	CSA N288.1-14	Table C1	
U-235	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	
U-236	Sv/Bq	1.00E-05	CSA N288.1-14	Table C1	unimportant relative to parent
U-238	Sv/Bq	9.40E-06	CSA N288.1-14	Table C1	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	1.80E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	Sv/Bq	3.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	Sv/Bq	1.10E-08	ICRP 72 (1996)		
Am-241	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Am-243	Sv/Bq	3.70E-07	CSA N288.1-14	Table C1	
Bi-210	Sv/Bq	9.70E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	Sv/Bq	1.60E-09	CSA N288.1-14	Table C2	
Ca-41	Sv/Bq	5.20E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	Sv/Bq	6.30E-09	CSA N288.1-14	Table C2	
Cm-244	Sv/Bq	2.90E-07	CSA N288.1-14	Table C1	
Co-60	Sv/Bq	2.70E-08	CSA N288.1-14	Table C2	
Cs-137	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-152	Sv/Bq	7.40E-09	CSA N288.1-14	Table C2	
Eu-154	Sv/Bq	1.20E-08	CSA N288.1-14	Table C2	
Eu-155	Sv/Bq	2.20E-09	CSA N288.1-14	Table C2	
Fe-55	Sv/Bq	2.40E-09	CSA N288.1-14	Table C2	
Gd-152	Sv/Bq	1.20E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	Sv/Bq	5.30E-11	CSA N288.1-14	Table C2	
I-129	Sv/Bq	2.20E-07	CSA N288.1-14	Table C2	
Nb-94	Sv/Bq	9.70E-09	CSA N288.1-14	Table C2	
Ni-59	Sv/Bq	3.40E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	Sv/Bq	8.40E-10	CSA N288.1-14	Table C2	
Np-237	Sv/Bq	2.10E-07	CSA N288.1-14	Table C2	
Np-239	Sv/Bq	5.70E-09	CSA N288.1-14	Table C2	
OBT	Sv/Bq	1.30E-10	CSA N288.1-14	Table C2	
Pa-231	Sv/Bq	1.30E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	Sv/Bq	6.20E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	Sv/Bq	3.60E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	Sv/Bq	8.80E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	Sv/Bq	4.00E-07	CSA N288.1-14	Table C2	
Pu-239	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-240	Sv/Bq	4.20E-07	CSA N288.1-14	Table C2	
Pu-241	Sv/Bq	5.70E-09	CSA N288.1-14	Table C1	
Ra-223	Sv/Bq	1.10E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	Sv/Bq	6.60E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	Sv/Bq	1.20E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	Sv/Bq	9.60E-07	CSA N288.1-14	Table C2	
Ra-228	Sv/Bq	5.70E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	Sv/Bq	7.30E-08	CSA N288.1-14	Table C2	
Tc-99	Sv/Bq	4.80E-09	CSA N288.1-14	Table C2	
Th-227	Sv/Bq	7.00E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	Sv/Bq	3.70E-07	CSA N288.1-14	Table C2	
Th-229	Sv/Bq	1.00E-06	CSA N288.1-14	Table C2	
Th-230	Sv/Bq	4.10E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	Sv/Bq	2.50E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	Sv/Bq	4.50E-07	CSA N288.1-14	Table C2	
Th-234	Sv/Bq	2.50E-08	CSA N288.1-14	Table C2	
U-233	Sv/Bq	1.40E-07	CSA N288.1-14	Table C2	
U-234	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-235	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	
U-236	Sv/Bq	1.30E-07	CSA N288.1-14	Table C2	unimportant relative to parent
U-238	Sv/Bq	1.20E-07	CSA N288.1-14	Table C2	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	1830	CSA N288.1-14	Table 19	I; mean
Fraction Of Time At Location	[]	0.0119	Not in DRL Guidance	EcoMetrix Suggestion	fo; the harvester spends 2 hours per week in each area, which is 1.19% of their time
Water Ingestion	L/a	98.915	CSA N288.1-14	Table 21	Iw; mean; .061 L/d
Soil Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Sediment Ingestion	kg(dw)/day	0.000061	CSA N288.1-14	Table 20	Is; mean; 0.061 g/d soil or sediment
Terrestrial Plant Ingestion	kg(fw)/a	7.96	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Terrestrial Animal Ingestion	kg(fw)/a	1.419	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Aquatic Plant Ingestion	kg(fw)/a	0	CNL 2018		
Aquatic Animal Ingestion	kg(fw)/a	2.851	CNL 2018		modified from adult survey porportionally to ratio of adult to child in N288.1
Outdoor Occupancy Factor	[]	1	Not in DRL Guidance	EcoMetrix suggestion	fu; the harvester spends all of its time outdoors
Water Occupancy Factor	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw
Water Exposed Area	m2	0.72	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	0.7	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	52	Not in DRL Guidance	EcoMetrix suggestion	EFsed; the harvester spends 1 day per week harvesting
Shoreline Occupancy Factor	[]	0.0119	Not in DRL Guidance	EcoMetrix Suggestion	(OF)s; the harvester spends 2 hours per week in each area, all outdoors, which is 1.19% of their time
Pool Occupancy Factor For Surface Water	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''
Pool Occupancy Factor For Groundwater	[]	0	CSA N288.1-14	cl. 6.16.1.3	OFw''

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/kg(dw sediment))	3.223E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/kg(dw sediment))	6.193E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/kg(dw sediment))	1.93E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/kg(dw sediment))	1.46E-08	CSA N288.1-14	Table C6	
Am-243	(Sv/a)/(Bq/kg(dw sediment))	0.000000198	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/kg(dw sediment))	6.064E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/kg(dw sediment))	6.11E-12	CSA N288.1-14	Table C6	
Ca-41	(Sv/a)/(Bq/kg(dw sediment))	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/kg(dw sediment))	8.881E-09	CSA N288.1-14	Table C6	
Cm-244	(Sv/a)/(Bq/kg(dw sediment))	2.47E-10	CSA N288.1-14	Table C6	
Co-60	(Sv/a)/(Bq/kg(dw sediment))	0.00000253	CSA N288.1-14	Table C6	
Cs-137	(Sv/a)/(Bq/kg(dw sediment))	0.000000614	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/kg(dw sediment))	0.00000117	CSA N288.1-14	Table C6	
Eu-154	(Sv/a)/(Bq/kg(dw sediment))	0.0000013	CSA N288.1-14	Table C6	
Eu-155	(Sv/a)/(Bq/kg(dw sediment))	4.57E-08	CSA N288.1-14	Table C6	
Fe-55	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
Gd-152	(Sv/a)/(Bq/kg(dw sediment))	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
I-129	(Sv/a)/(Bq/kg(dw sediment))	7.47E-09	CSA N288.1-14	Table C6	
Nb-94	(Sv/a)/(Bq/kg(dw sediment))	0.00000165	CSA N288.1-14	Table C6	
Ni-59	(Sv/a)/(Bq/kg(dw sediment))	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
Np-237	(Sv/a)/(Bq/kg(dw sediment))	0.000000223	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/kg(dw sediment))	0.00000016	CSA N288.1-14	Table C6	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/kg(dw sediment))	0	CSA N288.1-14	Table C6	
Pa-231	(Sv/a)/(Bq/kg(dw sediment))	0.000000445	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/kg(dw sediment))	2.049E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/kg(dw sediment))	6.177E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/kg(dw sediment))	8.931E-12	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/kg(dw sediment))	2.54E-10	CSA N288.1-14	Table C6	
Pu-239	(Sv/a)/(Bq/kg(dw sediment))	1.45E-10	CSA N288.1-14	Table C6	
Pu-240	(Sv/a)/(Bq/kg(dw sediment))	2.44E-10	CSA N288.1-14	Table C6	
Pu-241	(Sv/a)/(Bq/kg(dw sediment))	2.7E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/kg(dw sediment))	5.148E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/kg(dw sediment))	0.00000178	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/kg(dw sediment))	3.272E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/kg(dw sediment))	0.00000205	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/kg(dw sediment))	0.000002867	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/kg(dw sediment))	0.000000498	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/kg(dw sediment))	4.01E-11	CSA N288.1-14	Table C6	
Th-227	(Sv/a)/(Bq/kg(dw sediment))	0.00000062	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/kg(dw sediment))	0.00000178	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/kg(dw sediment))	0.000000405	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/kg(dw sediment))	3.604E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/kg(dw sediment))	4.948E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/kg(dw sediment))	0.00000287	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/kg(dw sediment))	0.000000411	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/kg(dw sediment))	1.96E-09	CSA N288.1-14	Table C6	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/kg(dw sediment))	2.83E-10	CSA N288.1-14	Table C6	
U-235	(Sv/a)/(Bq/kg(dw sediment))	0.000000163	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/kg(dw sediment))	2.25E-10	CSA N288.1-14	Table C6	
U-238	(Sv/a)/(Bq/kg(dw sediment))	0.000000411	CSA N288.1-14	Table C6	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/L)	0.000002118	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/L)	2.166E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/L)	7.59E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/L)	0.000000094	CSA N288.1-14	Table C5	
Am-243	(Sv/a)/(Bq/L)	0.00000042	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Bi-210	(Sv/a)/(Bq/L)	0.00000077	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/L)	8.05E-09	CSA N288.1-14	Table C5	
Ca-41	(Sv/a)/(Bq/L)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/L)	0.000000492	CSA N288.1-14	Table C5	
Cm-244	(Sv/a)/(Bq/L)	2.9E-09	CSA N288.1-14	Table C5	
Co-60	(Sv/a)/(Bq/L)	0.00000982	CSA N288.1-14	Table C5	
Cs-137	(Sv/a)/(Bq/L)	0.00000258	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/L)	0.00000458	CSA N288.1-14	Table C5	
Eu-154	(Sv/a)/(Bq/L)	0.00000524	CSA N288.1-14	Table C5	
Eu-155	(Sv/a)/(Bq/L)	0.000000231	CSA N288.1-14	Table C5	
Fe-55	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
Gd-152	(Sv/a)/(Bq/L)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
I-129	(Sv/a)/(Bq/L)	7.23E-08	CSA N288.1-14	Table C5	
Nb-94	(Sv/a)/(Bq/L)	0.00000628	CSA N288.1-14	Table C5	
Ni-59	(Sv/a)/(Bq/L)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
Np-237	(Sv/a)/(Bq/L)	0.000000132	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Np-239	(Sv/a)/(Bq/L)	0.000000868	CSA N288.1-14	Table C5	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/L)	0	CSA N288.1-14	Table C5	
Pa-231	(Sv/a)/(Bq/L)	1.634E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/L)	0.00000095	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/L)	1.089E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/L)	3.28E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/L)	3.01E-09	CSA N288.1-14	Table C5	
Pu-239	(Sv/a)/(Bq/L)	1.34E-09	CSA N288.1-14	Table C5	
Pu-240	(Sv/a)/(Bq/L)	2.88E-09	CSA N288.1-14	Table C5	
Pu-241	(Sv/a)/(Bq/L)	9.76E-12	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/L)	0.000003134	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/L)	0.00000539	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/L)	2.552E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/L)	0.00000142	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Ra-228	(Sv/a)/(Bq/L)	0.000004239	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/L)	0.000000789	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Tc-99	(Sv/a)/(Bq/L)	9.09E-08	CSA N288.1-14	Table C5	
Th-227	(Sv/a)/(Bq/L)	0.000000611	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/L)	0.000000631	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-229	(Sv/a)/(Bq/L)	3.595E-07	CSA N288.1-14	Table C5	
Th-230	(Sv/a)/(Bq/L)	3.19E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/L)	6.464E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/L)	3.41E-09	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
Th-234	(Sv/a)/(Bq/L)	0.00000191	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/L)	3.01E-09	CSA N288.1-14	Table C5	
U-234	(Sv/a)/(Bq/L)	3.01E-09	CSA N288.1-14	Table C5	
U-235	(Sv/a)/(Bq/L)	0.000000596	CSA N288.1-14	Table C5	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/L)	2.58E-09	CSA N288.1-14	Table C5	
U-238	(Sv/a)/(Bq/L)	5.57E-08	CSA N288.1-14	Table C5	DCF includes daughters (" ' " value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m2)	1.506E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m2)	3.246E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m2)	2.86E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m2)	2.63E-09	CSA N288.1-14	Table C4	
Am-243	(Sv/a)/(Bq/m2)	1.07E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Bi-210	(Sv/a)/(Bq/m2)	0.000000108	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m2)	2.35E-12	CSA N288.1-14	Table C4	
Ca-41	(Sv/a)/(Bq/m2)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m2)	3.343E-08	CSA N288.1-14	Table C4	
Cm-244	(Sv/a)/(Bq/m2)	2.75E-10	CSA N288.1-14	Table C4	
Co-60	(Sv/a)/(Bq/m2)	8.71E-08	CSA N288.1-14	Table C4	
Cs-137	(Sv/a)/(Bq/m2)	5.82E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m2)	5.52E-08	CSA N288.1-14	Table C4	
Eu-154	(Sv/a)/(Bq/m2)	9.18E-08	CSA N288.1-14	Table C4	
Eu-155	(Sv/a)/(Bq/m2)	2.22E-09	CSA N288.1-14	Table C4	
Fe-55	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
Gd-152	(Sv/a)/(Bq/m2)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
I-129	(Sv/a)/(Bq/m2)	1.83E-09	CSA N288.1-14	Table C4	
Nb-94	(Sv/a)/(Bq/m2)	0.000000059	CSA N288.1-14	Table C4	
Ni-59	(Sv/a)/(Bq/m2)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
Np-237	(Sv/a)/(Bq/m2)	1.12E-08	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Np-239	(Sv/a)/(Bq/m2)	8.3E-09	CSA N288.1-14	Table C4	progeny inclusive DCF not available since parent is gone
OBT	(Sv/a)/(Bq/m2)	0	CSA N288.1-14	Table C4	
Pa-231	(Sv/a)/(Bq/m2)	2.365E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m2)	9.296E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m2)	1.086E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m2)	3.469E-13	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m2)	3.04E-10	CSA N288.1-14	Table C4	
Pu-239	(Sv/a)/(Bq/m2)	1.16E-10	CSA N288.1-14	Table C4	
Pu-240	(Sv/a)/(Bq/m2)	2.9E-10	CSA N288.1-14	Table C4	
Pu-241	(Sv/a)/(Bq/m2)	4.87E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
Ra-223	(Sv/a)/(Bq/m2)	3.196E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m2)	0.000000286	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Ra-225	(Sv/a)/(Bq/m2)	1.517E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m2)	0.000000297	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Ra-228	(Sv/a)/(Bq/m2)	4.365E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m2)	0.000000336	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m2)	7.67E-12	CSA N288.1-14	Table C4	
Th-227	(Sv/a)/(Bq/m2)	0.000000325	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles. (corrected October 2018)
Th-228	(Sv/a)/(Bq/m2)	0.000000287	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-229	(Sv/a)/(Bq/m2)	0.000000157	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-230	(Sv/a)/(Bq/m2)	6.126E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m2)	2.396E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m2)	0.000000437	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
Th-234	(Sv/a)/(Bq/m2)	0.000000297	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-233	(Sv/a)/(Bq/m2)	7.84E-10	CSA N288.1-14	Table C4	DCF includes daughters (" ' " value)
U-234	(Sv/a)/(Bq/m2)	2.87E-10	CSA N288.1-14	Table C4	
U-235	(Sv/a)/(Bq/m2)	8.83E-09	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)
U-236	(Sv/a)/(Bq/m2)	2.67E-10	CSA N288.1-14	Table C4	
U-238	(Sv/a)/(Bq/m2)	0.000000297	CSA N288.1-14	Table C4	DCF includes daughters ("+" value)

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Sv/a)/(Bq/m3)	2.964E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ac-227	(Sv/a)/(Bq/m3)	3.469E-10	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ag-108m	(Sv/a)/(Bq/m3)	4.12E-06	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Am-241	(Sv/a)/(Bq/m3)	4.04E-08	CSA N288.1-14	Table C3	
Am-243	(Sv/a)/(Bq/m3)	8.68E-08	CSA N288.1-14	Table C3	
Bi-210	(Sv/a)/(Bq/m3)	7.253E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
C-14	(Sv/a)/(Bq/m3)	7.67E-09	CSA N288.1-14	Table C3	
Ca-41	(Sv/a)/(Bq/m3)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Cl-36	(Sv/a)/(Bq/m3)	4.636E-07	CSA N288.1-14	Table C3	
Cm-244	(Sv/a)/(Bq/m3)	1.23E-09	CSA N288.1-14	Table C3	
Co-60	(Sv/a)/(Bq/m3)	0.00000458	CSA N288.1-14	Table C3	
Cs-137	(Sv/a)/(Bq/m3)	0.00000139	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Eu-152	(Sv/a)/(Bq/m3)	0.00000218	CSA N288.1-14	Table C3	
Eu-154	(Sv/a)/(Bq/m3)	0.00000262	CSA N288.1-14	Table C3	
Eu-155	(Sv/a)/(Bq/m3)	0.000000107	CSA N288.1-14	Table C3	
Fe-55	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
Gd-152	(Sv/a)/(Bq/m3)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
HTO	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
I-129	(Sv/a)/(Bq/m3)	3.47E-08	CSA N288.1-14	Table C3	
Nb-94	(Sv/a)/(Bq/m3)	0.000003	CSA N288.1-14	Table C3	
Ni-59	(Sv/a)/(Bq/m3)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ni-63	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
Np-237	(Sv/a)/(Bq/m3)	4.86E-08	CSA N288.1-14	Table C3	
Np-239	(Sv/a)/(Bq/m3)	0.000000505	CSA N288.1-14	Table C3	
OBT	(Sv/a)/(Bq/m3)	0	CSA N288.1-14	Table C3	
Pa-231	(Sv/a)/(Bq/m3)	7.695E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pa-233	(Sv/a)/(Bq/m3)	5.235E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pb-210	(Sv/a)/(Bq/m3)	4.037E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Po-210	(Sv/a)/(Bq/m3)	1.517E-11	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Pu-238	(Sv/a)/(Bq/m3)	1.29E-09	CSA N288.1-14	Table C3	
Pu-239	(Sv/a)/(Bq/m3)	5.87E-10	CSA N288.1-14	Table C3	
Pu-240	(Sv/a)/(Bq/m3)	1.24E-09	CSA N288.1-14	Table C3	
Pu-241	(Sv/a)/(Bq/m3)	3.69E-12	CSA N288.1-14	Table C3	
Ra-223	(Sv/a)/(Bq/m3)	2.797E-07	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-224	(Sv/a)/(Bq/m3)	0.00000002	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-225	(Sv/a)/(Bq/m3)	2.003E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Ra-226	(Sv/a)/(Bq/m3)	1.511E-08	CSA N288.1-14	Table C3	
Ra-228	(Sv/a)/(Bq/m3)	0	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Sr-90	(Sv/a)/(Bq/m3)	0.00000226	CSA N288.1-14	Table C3	DCF includes daughters ("+" value)
Tc-99	(Sv/a)/(Bq/m3)	8.65E-08	CSA N288.1-14	Table C3	
Th-227	(Sv/a)/(Bq/m3)	0.000000205	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-228	(Sv/a)/(Bq/m3)	4.73E-09	CSA N288.1-14	Table C3	
Th-229	(Sv/a)/(Bq/m3)	1.706E-07	CSA N288.1-14	Table C3	
Th-230	(Sv/a)/(Bq/m3)	1.422E-09	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-231	(Sv/a)/(Bq/m3)	7.947E-08	EcoMetrix Estimation 2017		The DCF value is progeny inclusive calculated following CSA N288.1-14 principles.
Th-232	(Sv/a)/(Bq/m3)	1.08E-09	CSA N288.1-14	Table C3	
Th-234	(Sv/a)/(Bq/m3)	0.00000175	CSA N288.1-14	Table C3	DCF includes daughters (" ' " value)
U-233	(Sv/a)/(Bq/m3)	1.441E-09	CSA N288.1-14	Table C3	
U-234	(Sv/a)/(Bq/m3)	1.34E-09	CSA N288.1-14	Table C3	
U-235	(Sv/a)/(Bq/m3)	0.000000273	CSA N288.1-14	Table C3	
U-236	(Sv/a)/(Bq/m3)	1.13E-09	CSA N288.1-14	Table C3	unimportant relative to parent
U-238	(Sv/a)/(Bq/m3)	9.18E-10	CSA N288.1-14	Table C3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	-1			
Ac-227	Sv/Bq	-1			
Ag-108m	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Am-241	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Am-243	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Bi-210	Sv/Bq	-1			
C-14	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Ca-41	Sv/Bq	-1			
Cl-36	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Cm-244	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Co-60	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Cs-137	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Eu-152	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Eu-154	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Eu-155	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Fe-55	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Gd-152	Sv/Bq	-1			
HTO	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
I-129	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Nb-94	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Ni-59	Sv/Bq	-1			
Ni-63	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Np-237	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Np-239	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
OBT	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Pa-231	Sv/Bq	-1			
Pa-233	Sv/Bq	-1			
Pb-210	Sv/Bq	-1			
Po-210	Sv/Bq	-1			
Pu-238	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Pu-239	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Pu-240	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Pu-241	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Ra-223	Sv/Bq	-1			
Ra-224	Sv/Bq	-1			
Ra-225	Sv/Bq	-1			
Ra-226	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Ra-228	Sv/Bq	-1			
Sr-90	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Tc-99	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Th-227	Sv/Bq	-1			
Th-228	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Th-229	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Th-230	Sv/Bq	-1			
Th-231	Sv/Bq	-1			
Th-232	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
Th-234	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
U-233	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
U-234	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
U-235	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
U-236	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor
U-238	Sv/Bq	0	CSA N288.1-14		Inhalation not relevant to "Skin" receptor

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	Sv/Bq	-1			
Ac-227	Sv/Bq	-1			
Ag-108m	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Am-241	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Am-243	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Bi-210	Sv/Bq	-1			
C-14	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Ca-41	Sv/Bq	-1			
Cl-36	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Cm-244	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Co-60	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Cs-137	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Eu-152	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Eu-154	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Eu-155	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Fe-55	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Gd-152	Sv/Bq	-1			
HTO	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
I-129	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Nb-94	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Ni-59	Sv/Bq	-1			
Ni-63	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Np-237	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Np-239	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
OBT	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Pa-231	Sv/Bq	-1			
Pa-233	Sv/Bq	-1			
Pb-210	Sv/Bq	-1			
Po-210	Sv/Bq	-1			
Pu-238	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Pu-239	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Pu-240	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Pu-241	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Ra-223	Sv/Bq	-1			
Ra-224	Sv/Bq	-1			
Ra-225	Sv/Bq	-1			
Ra-226	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Ra-228	Sv/Bq	-1			
Sr-90	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Tc-99	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Th-227	Sv/Bq	-1			
Th-228	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Th-229	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Th-230	Sv/Bq	-1			
Th-231	Sv/Bq	-1			
Th-232	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
Th-234	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
U-233	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
U-234	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
U-235	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
U-236	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin
U-238	Sv/Bq	0	CSA N288.1-14		Ingestion Dose not relevant for Skin

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ac-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ag-108m	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Am-243	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Bi-210	[]	0	CSA N288.1-14	cl. 6.14.3	
C-14	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Ca-41	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cl-36	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Cm-244	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Co-60	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Cs-137	[]	0.2	CSA N288.1-14	cl. 6.14.3	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-154	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Eu-155	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Fe-55	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Gd-152	[]	0.2	CSA N288.1-14	cl. 6.14.3	
HTO	[]	0.2	CSA N288.1-14	cl. 6.14.3	
I-129	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Nb-94	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-59	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ni-63	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Np-237	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Np-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
OBT	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pa-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pb-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Po-210	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-239	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-240	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Pu-241	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-223	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-224	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-225	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-226	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Ra-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Sr-90	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Tc-99	[]	0	CSA N288.1-14	cl. 6.14.3	essentially pure beta emitter
Th-227	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-228	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-229	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-230	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-231	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-232	[]	0.2	CSA N288.1-14	cl. 6.14.3	
Th-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-233	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-234	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-235	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-236	[]	0.2	CSA N288.1-14	cl. 6.14.3	
U-238	[]	0.2	CSA N288.1-14	cl. 6.14.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ac-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ag-108m	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Am-243	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Bi-210	[]	1	CSA N288.1-14	cl. 6.2.5	
C-14	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Ca-41	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cl-36	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Cm-244	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Co-60	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Cs-137	[]	0.5	CSA N288.1-14	cl. 6.2.5	Cs-137 essentially pure beta emitter, but daughter Ba-137m is not
Eu-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-154	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Eu-155	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Fe-55	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Gd-152	[]	0.5	CSA N288.1-14	cl. 6.2.5	
HTO	[]	0.5	CSA N288.1-14	cl. 6.2.5	
I-129	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Nb-94	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-59	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ni-63	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Np-237	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Np-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
OBT	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pa-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pb-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Po-210	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-239	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-240	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Pu-241	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-223	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-224	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-225	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-226	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Ra-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Sr-90	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Tc-99	[]	1	CSA N288.1-14	cl. 6.2.5	essentially pure beta emitter
Th-227	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-228	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-229	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-230	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-231	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-232	[]	0.5	CSA N288.1-14	cl. 6.2.5	
Th-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-233	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-234	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-235	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-236	[]	0.5	CSA N288.1-14	cl. 6.2.5	
U-238	[]	0.5	CSA N288.1-14	cl. 6.2.5	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Inhalation	m3/a	0	Not Applicable		I; not relevant to skin dose
Fraction Of Time At Location	[]	1	CSA N288.1-14	cl. 6.14.3	fo
Water Ingestion	L/a	0	Not Applicable		Iw; not relevant to skin dose
Soil Ingestion	kg(dw)/day	0	Not Applicable		Is; not relevant to skin dose
Sediment Ingestion	kg(dw)/day	0	Not Applicable		Is; not relevant to skin dose
Terrestrial Plant Ingestion	kg(fw)/a	0	Not Applicable		If; not relevant to skin dose
Terrestrial Animal Ingestion	kg(fw)/a	0	Not Applicable		If; not relevant to skin dose
Aquatic Plant Ingestion	kg(fw)/a	0	Not Applicable		If; not relevant to skin dose
Aquatic Animal Ingestion	kg(fw)/a	0	Not Applicable		If; not relevant to skin dose
Outdoor Occupancy Factor	[]	0.2	CSA N288.1-14	cl. 6.14.3	fu
Water Occupancy Factor	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw 3 months instead of 4
Water Exposed Area	m2	2.19	CSA N288.1-14	Table 22	Sa
Soil Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp
Sediment Dilution Factor	[]	1	CSA N288.1-14	cl. 7.10.4	(DF)s
Bathing Occupancy Factor	[]	0.014	CSA N288.1-14	cl. 6.16.1.3	OFw'
Bathtub Correction Factor	[]	1	CSA N288.1-14	cl. 6.16.12	Dc
Diffusion Rate For Water-Wetted Skin	L/m2/a	105	CSA N288.1-14	cl. 6.16.2.2	Ds
Soil Exposure Frequency	d/a	135	CSA N288.1-14	cl. 6.15.4.3	EFs
Sediment Exposure Frequency	d/a	45	CSA N288.1-14	cl. 6.15.4.3	EFsed
Shoreline Occupancy Factor	[]	0.02	CSA N288.1-14	cl. 7.10.4	(OF)s
Pool Occupancy Factor For Surface Water	[]	0.03125	CSA N288.1-14	cl. 7.6.1.2	OFw'' 9 months instead of 8
Pool Occupancy Factor For Groundwater	[]	0.0104	CSA N288.1-14	cl. 6.16.1.3	OFw'' 3 months instead of 4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg	95000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-241	L/kg	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-243	L/kg	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Bi-210	L/kg	5000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ca-41	L/kg	190	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg	20	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cm-244	L/kg	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Co-60	L/kg	43000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cs-137	L/kg	9500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-152	L/kg	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-154	L/kg	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-155	L/kg	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Fe-55	L/kg	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Gd-152	L/kg	990	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
HTO	L/kg	0	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
I-129	L/kg	4400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Nb-94	L/kg	1700	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-59	L/kg	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-63	L/kg	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-237	L/kg	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-239	L/kg	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
OBT	L/kg	0	Not Applicable		found in biological tissues
Pa-231	L/kg	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pa-233	L/kg	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pb-210	L/kg	1300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg	1.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-239	L/kg	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-240	L/kg	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-241	L/kg	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-223	L/kg	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-224	L/kg	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-225	L/kg	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-226	L/kg	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-228	L/kg	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Sr-90	L/kg	190	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Tc-99	L/kg	5	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-227	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-228	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-229	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-230	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-231	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-232	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-234	L/kg	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-233	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-234	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-235	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-236	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-238	L/kg	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Deposition Rate	mm/a	0	CSA N288.1-14	cl. 6.6.2.2	DR; default for river water is zero; site-specific lambda(s) can be calculated using cl. 6.6.2.2 with Ap/Vp = water depth
Sediment DryBulkDensity	kg(dw)/L	0	CSA N288.1-14	cl. 6.6.2.2	default for river water is zero; site-specific lambda(s) can be calculated using cl. 6.6.2.2 with Ap/Vp = water depth

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(dw)	95000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-241	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-243	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Bi-210	L/kg(dw)	5000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ca-41	L/kg(dw)	190	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(dw)	20	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cm-244	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Co-60	L/kg(dw)	43000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cs-137	L/kg(dw)	9500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-152	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-154	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-155	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Fe-55	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Gd-152	L/kg(dw)	990	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
HTO	L/kg(dw)	0	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
I-129	L/kg(dw)	4400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Nb-94	L/kg(dw)	1700	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-59	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-63	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-237	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-239	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
OBT	L/kg(dw)	0	Not Applicable		found in biological tissues
Pa-231	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pa-233	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pb-210	L/kg(dw)	1300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(dw)	1.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-239	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-240	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-241	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-223	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-224	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-225	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-226	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-228	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Sr-90	L/kg(dw)	190	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Tc-99	L/kg(dw)	5	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-227	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-228	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-229	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-230	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-231	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-232	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-234	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-233	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-234	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-235	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-236	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-238	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ac-227	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ag-108m	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Am-241	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Am-243	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Bi-210	[]	-1	Not Applicable		W; generally pond shore not used as a beach
C-14	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ca-41	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Cl-36	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Cm-244	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Co-60	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Cs-137	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Eu-152	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Eu-154	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Eu-155	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Fe-55	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Gd-152	[]	-1	Not Applicable		W; generally pond shore not used as a beach
HTO	[]	-1	Not Applicable		W; generally pond shore not used as a beach
I-129	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Nb-94	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ni-59	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ni-63	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Np-237	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Np-239	[]	-1	Not Applicable		W; generally pond shore not used as a beach
OBT	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pa-231	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pa-233	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pb-210	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Po-210	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pu-238	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pu-239	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pu-240	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Pu-241	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ra-223	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ra-224	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ra-225	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ra-226	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Ra-228	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Sr-90	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Tc-99	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-227	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-228	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-229	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-230	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-231	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-232	[]	-1	Not Applicable		W; generally pond shore not used as a beach
Th-234	[]	-1	Not Applicable		W; generally pond shore not used as a beach
U-233	[]	-1	Not Applicable		W; generally pond shore not used as a beach
U-234	[]	-1	Not Applicable		W; generally pond shore not used as a beach
U-235	[]	-1	Not Applicable		W; generally pond shore not used as a beach
U-236	[]	-1	Not Applicable		W; generally pond shore not used as a beach
U-238	[]	-1	Not Applicable		W; generally pond shore not used as a beach

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Bulk Density	kg(dw)/L	0.4	CSA N288.1-14	cl. 6.6.2.2	rhos; used in dw to ww conversion, for biota external dose
Water Content	[]	0.8	EcoMetrix Suggestion 2014		used in dw to ww conversion, for biota external dose
Mixing Depth	m	0.05	EcoMetrix Suggestion 2014		used in dw to ww conversion, for biota external dose

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(dw)	95000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-241	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-243	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Bi-210	L/kg(dw)	5000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ca-41	L/kg(dw)	190	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(dw)	20	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cm-244	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Co-60	L/kg(dw)	43000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cs-137	L/kg(dw)	9500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-152	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-154	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-155	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Fe-55	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Gd-152	L/kg(dw)	990	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
HTO	L/kg(dw)	0	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
I-129	L/kg(dw)	4400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Nb-94	L/kg(dw)	1700	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-59	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-63	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-237	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-239	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
OBT	L/kg(dw)	0	Not Applicable		found in biological tissues
Pa-231	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pa-233	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pb-210	L/kg(dw)	1300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(dw)	1.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-239	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-240	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-241	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-223	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-224	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-225	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-226	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-228	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Sr-90	L/kg(dw)	190	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Tc-99	L/kg(dw)	5	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-227	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-228	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-229	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-230	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-231	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-232	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-234	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-233	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-234	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-235	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-236	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-238	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ac-227	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ag-108m	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Am-241	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Am-243	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Bi-210	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
C-14	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Ca-41	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Cl-36	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Cm-244	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Co-60	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Cs-137	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Eu-152	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Eu-154	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Eu-155	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Fe-55	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Gd-152	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
HTO	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
I-129	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Nb-94	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ni-59	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ni-63	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Np-237	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Np-239	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
OBT	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pa-231	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pa-233	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pb-210	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Po-210	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pu-238	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pu-239	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pu-240	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Pu-241	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ra-223	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ra-224	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ra-225	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ra-226	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Ra-228	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Sr-90	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Tc-99	[]	1	CSA N288.1-14	cl. 7.10.3	essentially pure beta emitters
Th-227	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-228	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-229	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-230	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-231	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-232	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
Th-234	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
U-233	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
U-234	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
U-235	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
U-236	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters
U-238	[]	0.2	CSA N288.1-14	cl. 7.10.3	W; value is 1 for essentially pure beta emitters

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Bulk Density	kg(dw)/L	0.4	CSA N288.1-14	cl. 6.6.2.2	rhos; used in dw to ww conversion, for biota external dose
Water Content	[]	0.8	EcoMetrix Suggestion 2014		used in dw to ww conversion, for biota external dose
Mixing Depth	m	0.05	EcoMetrix Suggestion 2014		used in dw to ww conversion, for biota external dose

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	1/s	-1			
Ac-227	1/s	-1			
Ag-108m	1/s	-1			
Am-241	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Am-243	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Bi-210	1/s	-1			
C-14	1/s	0.000000067	CSA N288.1-14	cl. 6.6.2.5	
Ca-41	1/s	-1			
Cl-36	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Cm-244	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Co-60	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Cs-137	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Eu-152	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Eu-154	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Eu-155	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Fe-55	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Gd-152	1/s	-1			
HTO	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
I-129	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Nb-94	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Ni-59	1/s	-1			
Ni-63	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Np-237	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Np-239	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
OBT	1/s	0	Not Applicable		found in biological tissues
Pa-231	1/s	-1			
Pa-233	1/s	-1			
Pb-210	1/s	-1			
Po-210	1/s	-1			
Pu-238	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Pu-239	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Pu-240	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Pu-241	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Ra-223	1/s	-1			
Ra-224	1/s	-1			
Ra-225	1/s	-1			
Ra-226	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Ra-228	1/s	-1			
Sr-90	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Tc-99	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Th-227	1/s	-1			
Th-228	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Th-229	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Th-230	1/s	-1			
Th-231	1/s	-1			
Th-232	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
Th-234	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
U-233	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
U-234	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
U-235	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
U-236	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond
U-238	1/s	0	CSA N288.1-14	cl. 6.6.2.5	negligible volatilization from pond

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(dw)	1700	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg	95000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-241	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Am-243	L/kg(dw)	210000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Bi-210	L/kg(dw)	5000	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ca-41	L/kg(dw)	190	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(dw)	20	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cm-244	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Co-60	L/kg(dw)	43000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Cs-137	L/kg(dw)	9500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-152	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-154	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Eu-155	L/kg(dw)	500	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Fe-55	L/kg(dw)	5000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Gd-152	L/kg(dw)	990	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
HTO	L/kg(dw)	0	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
I-129	L/kg(dw)	4400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Nb-94	L/kg(dw)	1700	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-59	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ni-63	L/kg(dw)	1400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-237	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Np-239	L/kg(dw)	10	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
OBT	L/kg(dw)	0	Not Applicable		found in biological tissues
Pa-231	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pa-233	L/kg(dw)	5400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pb-210	L/kg(dw)	1300	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(dw)	1.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-239	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-240	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Pu-241	L/kg(dw)	240000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-223	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-224	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-225	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-226	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Ra-228	L/kg(dw)	7400	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Sr-90	L/kg(dw)	190	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Tc-99	L/kg(dw)	5	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-227	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-228	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-229	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-230	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-231	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-232	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
Th-234	L/kg(dw)	190000	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-233	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-234	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-235	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-236	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine
U-238	L/kg(dw)	50	CSA N288.1-14	Table A.26	freshwater sediment value, also used for marine

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Deposition Rate	mm/a	10	CSA N288.1-14	cl. 6.6.2.2	DR
Dissolved Inorganic Carbon In Pond	mg/L	21.4	CSA N288.1-14	cl. 6.7.4	X2p_C; Great Lakes value assumed for pond
HTO Ratio Water To Air	m3/L	100	CSA N288.1-14	cl. 6.7.3	P12p_HTO; default value based on bucket tests
Net Precipitation	mm/a	324.8	CSA N288.1-14	Table 15	Pn; value for western Ontario
Sediment Dry BulkDensity	kg(dw)/L	0.4	CSA N288.1-14	cl. 6.6.2.2	default value for ponds

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ac-227	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ag-108m	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Am-241	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Am-243	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Bi-210	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
C-14	1/s	0.00000043	CSA N288.1-14	cl. 6.3.5	
Ca-41	1/s	-1			
Cl-36	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Cm-244	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Co-60	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Cs-137	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Eu-152	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Eu-154	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Eu-155	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Fe-55	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Gd-152	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
HTO	1/s	0	Not Applicable		specific activity model is used
I-129	1/s	6.7E-10	CSA N288.1-14	cl. 6.3.5	
Nb-94	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ni-59	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ni-63	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Np-237	1/s	0	Not Applicable		Not Applicable
Np-239	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
OBT	1/s	0	Not Applicable		found in biological tissues
Pa-231	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pa-233	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pb-210	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Po-210	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pu-238	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pu-239	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pu-240	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Pu-241	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ra-223	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ra-224	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ra-225	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ra-226	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Ra-228	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Sr-90	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Tc-99	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-227	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-228	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-229	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-230	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-231	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-232	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
Th-234	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
U-233	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
U-234	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
U-235	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
U-236	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil
U-238	1/s	0	CSA N288.1-14	cl. 6.3.5	negligible volatilization from soil

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0015			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0	Not Applicable		specific activity model is used
Ca-41	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.87			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant)/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0	Not Applicable		specific activity model is used
I-129	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0	Not Applicable		only in biological tissues
Pa-231	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.033	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.033	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.41			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.063			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant)/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant)/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	L/kg(dw)	876			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	L/kg(dw)	876			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	L/kg(dw)	180	CSA N288.1-14	Table G.2	
Am-241	L/kg(dw)	4300	CSA N288.1-14	Table G.2	
Am-243	L/kg(dw)	4300	CSA N288.1-14	Table G.2	
Bi-210	L/kg(dw)	240			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	L/kg(dw)	1	CSA N288.1-14	Table G.2	
Ca-41	L/kg(dw)	69			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	L/kg(dw)	8	CSA N288.1-14	Table G.2	
Cm-244	L/kg(dw)	5400	CSA N288.1-14	Table G.2	
Co-60	L/kg(dw)	3800	CSA N288.1-14	Table G.2	
Cs-137	L/kg(dw)	370	CSA N288.1-14	Table G.2	
Eu-152	L/kg(dw)	653	CSA N288.1-14	Table G.2	
Eu-154	L/kg(dw)	653	CSA N288.1-14	Table G.2	
Eu-155	L/kg(dw)	653	CSA N288.1-14	Table G.2	
Fe-55	L/kg(dw)	1600	CSA N288.1-14	Table G.2	
Gd-152	L/kg(dw)	524	CSA N288.1-14	Table G.2	
HTO	L/kg(dw)	0	CSA N288.1-14	Table G.2	
I-129	L/kg(dw)	12	CSA N288.1-14	Table G.2	
Nb-94	L/kg(dw)	2500	CSA N288.1-14	Table G.2	
Ni-59	L/kg(dw)	980	CSA N288.1-14	Table G.2	
Ni-63	L/kg(dw)	980	CSA N288.1-14	Table G.2	
Np-237	L/kg(dw)	55	CSA N288.1-14	Table G.2	
Np-239	L/kg(dw)	55	CSA N288.1-14	Table G.2	
OBT	L/kg(dw)	0	Not Applicable		only in biological tissues
Pa-231	L/kg(dw)	2700	CSA N288.1-14	Table G.2	
Pa-233	L/kg(dw)	2700	CSA N288.1-14	Table G.2	
Pb-210	L/kg(dw)	670			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	L/kg(dw)	720			The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	L/kg(dw)	1100	CSA N288.1-14	Table G.2	
Pu-239	L/kg(dw)	1100	CSA N288.1-14	Table G.2	
Pu-240	L/kg(dw)	1100	CSA N288.1-14	Table G.2	
Pu-241	L/kg(dw)	1100	CSA N288.1-14	Table G.2	
Ra-223	L/kg(dw)	38000	CSA N288.1-14	Table G.2	
Ra-224	L/kg(dw)	38000	CSA N288.1-14	Table G.2	
Ra-225	L/kg(dw)	38000	CSA N288.1-14	Table G.2	
Ra-226	L/kg(dw)	38000	CSA N288.1-14	Table G.2	
Ra-228	L/kg(dw)	38000	CSA N288.1-14	Table G.2	
Sr-90	L/kg(dw)	69	CSA N288.1-14	Table G.2	
Tc-99	L/kg(dw)	0.09	CSA N288.1-14	Table G.2	
Th-227	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-228	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-229	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-230	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-231	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-232	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
Th-234	L/kg(dw)	4500	CSA N288.1-14	Table G.2	
U-233	L/kg(dw)	280	CSA N288.1-14	Table G.2	
U-234	L/kg(dw)	280	CSA N288.1-14	Table G.2	
U-235	L/kg(dw)	280	CSA N288.1-14	Table G.2	
U-236	L/kg(dw)	280	CSA N288.1-14	Table G.2	
U-238	L/kg(dw)	280	CSA N288.1-14	Table G.2	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Dry Bulk Density	kg(dw)/L	1.4	CSA N288.1-14	cl. 6.3.2.2	rhob
Water Content	[]	0.3	CSA N288.1-14	cl. 6.3.4.3	theta
Mixing Depth	m	0.2	CSA N288.1-14	cl. 6.3.4.3	Zsoil
Infiltration Rate	m3/m2/s	1.205E-08	CSA N288.1-14	cl. 6.3.6.3	qinfil; value for western Ontario (0.38 m/a)
Erosion Rate	kg(dw)/m2/s	0.00000005	CSA N288.1-14	cl. 6.3.4.3	ER; value for ploughed loam or clay soils
Plant Yield	kg(fw)/m2	1	CSA N288.1-14	Table G.5	Yc; default value for generic fruits and vegetables
Plant Harvest Index	[]	0.8	CSA N288.1-14	Table G.5	hi; default value for generic fruits and vegetables
Plant Cropping Frequency	1/s	3.17E-08	CSA N288.1-14	cl. 6.3.7.1	cf; conservative value - once per year
Plant Dry Fresh Weight Ratio	[]	0.1	CSA N288.1-14	Table G.5	DWp; default value for generic fruits and vegetables

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	1083	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	1083	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	13.14	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	3.264	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	3.264	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	1.93	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.2054	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	12.44	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	2.312	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	18.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	19.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	10.34	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	10.34	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	10.34	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	27.02	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	1300	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.06186	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.04236	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	10.22	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	10.22	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	8.432	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	8.432	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	5.44	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	5.44	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	327.8	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	6.162	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	2.502	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	2.502	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	2.502	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	2.502	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.3758	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.3758	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.3758	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.3758	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.3758	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.2054	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	3.471	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	11.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	55.11	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	55.11	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	55.11	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	55.11	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	55.11	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	1.129	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	1.129	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	4.515	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.01354	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.01354	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	1.129	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.2257	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	19.75	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.00959	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	10.95	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	30.47	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.04289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.04289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.04289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	15.8	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	1.354	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.09819	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.00339	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	3.499	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	3.499	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.03499	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.03499	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.02257	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.02257	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	13.54	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	6.772	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.01038	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.01038	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.01038	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.01038	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.3386	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.3386	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.3386	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.3386	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.3386	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.2257	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	4.627	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.1129	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	8.465	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	8.465	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	8.465	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	8.465	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	8.465	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.058			U.S. EPA 1993 (allometric scaling)
Soil Intake	kg(dw)/day	0.000489	FCSAP (2012)		Sample and Suter (1994) calcuation based on 1) assumtions that soil consumption proportional to earthworm consumption; 2) American Woodcock (10.4%); 3) and robin consumes 40% earthworms
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.011	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	0.01224	FCSAP (2012)		Animal ingestion rate in fresh weight was multiplied by the weighted sum of plant moisture content; value for fruits reported in CSA 288.1-14 (Table G.5) because berry concentrations were used for the American Robin.
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		earthworm is plant
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	3193	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	3193	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	38.71	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	9.618	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	9.618	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	5.687	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.6053	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	36.67	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	6.813	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	55.16	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	56.57	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	30.46	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	30.46	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	30.46	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	79.62	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	3831	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.1823	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.1248	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	30.1	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	30.1	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	24.85	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	24.85	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	16.03	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	16.03	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	965.8	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	18.16	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	7.374	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	7.374	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	7.374	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	7.374	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	1.107	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	1.107	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	1.107	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	1.107	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	1.107	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.6053	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	10.23	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	33.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	162.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	162.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	162.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	162.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	162.4	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	3.326	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	3.326	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	13.3	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.03991	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.03991	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	3.326	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.6652	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	58.2	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.02827	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	32.26	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	89.8	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.1264	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.1264	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.1264	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	46.56	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	3.991	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.2893	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.00998	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	10.31	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	10.31	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.1031	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.1031	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.06652	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.06652	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	39.91	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	19.95	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0306	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.0306	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.0306	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.0306	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.9977	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.9977	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.9977	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.9977	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.9977	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.6652	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	13.64	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.3326	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	24.94	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	24.94	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	24.94	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	24.94	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	24.94	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.019	FCSAP (2012)		U.S. EPA 1993 (allometric scaling)
Soil Intake	kg(dw)/day	0.0000972	FCSAP (2012)		2% default
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.004	FCSAP (2012)		U.S. EPA 1993 (allometric scaling)
Terrestrial Plant Intake	kg(dw)/day	0	Not Applicable		
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0.019448	FCSAP (2012)		
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0.5			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1248	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1248	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.006111	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.1205	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.1205	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.002052	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.001183	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.01071	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.004579	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.0007353	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.01386	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.5302	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.5302	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.5302	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.02394	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	1.92	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.004221	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	3.2526E-06	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.0146	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.0146	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.09158	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.09158	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.002651	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.002651	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	0.2662	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.00637	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0002651	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.0002651	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.0002651	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.0002651	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.001887	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.001887	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.001887	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.001887	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.001887	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.001183	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.00072	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	0.02323	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	0.0025389	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	0.0025389	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	0.0025389	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	0.0025389	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	0.0025389	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.00013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.00013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.0021	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.0005	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.0005	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.0012	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.0013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.017	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.000019	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.00043	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.022	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.014	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.0067	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.00000026	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.005	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.005	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.000011	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.000011	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.011	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.007	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0000011	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.0000011	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.0000011	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.0000011	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.0017	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.0017	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.0017	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.0017	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.0017	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.0013	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.00096	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	91	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	1.42	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	43	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	13.2	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.51	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef cow
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	fOBT; value for beef cow
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.67	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.67	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.015	DRL Guidance 2013	Table G21	
Am-241	day/kg(fw)	0.0031	DRL Guidance 2013	Table G21	
Am-243	day/kg(fw)	0.0031	DRL Guidance 2013	Table G21	
Bi-210	day/kg(fw)	0.0025	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0.0046	DRL Guidance 2013	Table G21	
Ca-41	day/kg(fw)	0.015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.23	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Cm-244	day/kg(fw)	0.0028	DRL Guidance 2013	Table G21	
Co-60	day/kg(fw)	0.026	DRL Guidance 2013	Table G21	
Cs-137	day/kg(fw)	0.053	DRL Guidance 2013	Table G21	
Eu-152	day/kg(fw)	0.14	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Eu-154	day/kg(fw)	0.14	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Eu-155	day/kg(fw)	0.14	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Fe-55	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Gd-152	day/kg(fw)	1.2	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
HTO	day/kg(fw)	0.59	DRL Guidance 2013	Table G21	
I-129	day/kg(fw)	0.36	DRL Guidance 2013	Table G21	
Nb-94	day/kg(fw)	0.0018	DRL Guidance 2013	Table G21	
Ni-59	day/kg(fw)	0.0063	DRL Guidance 2013	Table G21	
Ni-63	day/kg(fw)	0.0063	DRL Guidance 2013	Table G21	
Np-237	day/kg(fw)	0.0056	DRL Guidance 2013	Table G21	
Np-239	day/kg(fw)	0.0056	DRL Guidance 2013	Table G21	
OBT	day/kg(fw)	0	DRL Guidance 2013	Table G21	
Pa-231	day/kg(fw)	-1			
Pa-233	day/kg(fw)	-1			
Pb-210	day/kg(fw)	0.53	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.0071	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0034	DRL Guidance 2013	Table G21	
Pu-239	day/kg(fw)	0.0034	DRL Guidance 2013	Table G21	
Pu-240	day/kg(fw)	0.0034	DRL Guidance 2013	Table G21	
Pu-241	day/kg(fw)	0.0034	DRL Guidance 2013	Table G21	
Ra-223	day/kg(fw)	0.0054	DRL Guidance 2013	Table G21	
Ra-224	day/kg(fw)	0.0054	DRL Guidance 2013	Table G21	
Ra-225	day/kg(fw)	0.0054	DRL Guidance 2013	Table G21	
Ra-226	day/kg(fw)	0.0054	DRL Guidance 2013	Table G21	
Ra-228	day/kg(fw)	0.0054	DRL Guidance 2013	Table G21	
Sr-90	day/kg(fw)	0.015	DRL Guidance 2013	Table G21	
Tc-99	day/kg(fw)	0.01	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Th-227	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-228	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-229	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-230	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-231	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-232	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
Th-234	day/kg(fw)	0.00028	DRL Guidance 2013	Table G21	
U-233	day/kg(fw)	0.0039	DRL Guidance 2013	Table G21	
U-234	day/kg(fw)	0.0039	DRL Guidance 2013	Table G21	
U-235	day/kg(fw)	0.0039	DRL Guidance 2013	Table G21	
U-236	day/kg(fw)	0.0039	DRL Guidance 2013	Table G21	
U-238	day/kg(fw)	0.0036	DRL Guidance 2013	Table G21	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.0007	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.0007	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.012	DRL Guidance 2013	Table G21	
Am-241	day/kg(fw)	2.9E-05	DRL Guidance 2013	Table G21	
Am-243	day/kg(fw)	2.9E-05	DRL Guidance 2013	Table G21	
Bi-210	day/kg(fw)	0.0014	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0.23	DRL Guidance 2013	Table G21	
Ca-41	day/kg(fw)	0.069	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.37	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Cm-244	day/kg(fw)	2.8E-05	DRL Guidance 2013	Table G21	
Co-60	day/kg(fw)	0.043	DRL Guidance 2013	Table G21	
Cs-137	day/kg(fw)	0.15	DRL Guidance 2013	Table G21	
Eu-152	day/kg(fw)	0.00058	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Eu-154	day/kg(fw)	0.00058	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Eu-155	day/kg(fw)	0.00058	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Fe-55	day/kg(fw)	0.0026	DRL Guidance 2013	Table G21	
Gd-152	day/kg(fw)	0.0012	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
HTO	day/kg(fw)	0.39	DRL Guidance 2013	Table G21	
I-129	day/kg(fw)	0.41	DRL Guidance 2013	Table G21	
Nb-94	day/kg(fw)	0.00035	DRL Guidance 2013	Table G21	
Ni-59	day/kg(fw)	0.0048	DRL Guidance 2013	Table G21	
Ni-63	day/kg(fw)	0.0048	DRL Guidance 2013	Table G21	
Np-237	day/kg(fw)	5.2E-05	DRL Guidance 2013	Table G21	
Np-239	day/kg(fw)	5.2E-05	DRL Guidance 2013	Table G21	
OBT	day/kg(fw)	0.31	DRL Guidance 2013	Table G21	
Pa-231	day/kg(fw)	-1			
Pa-233	day/kg(fw)	-1			
Pb-210	day/kg(fw)	0.022	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.0078	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00003	DRL Guidance 2013	Table G21	
Pu-239	day/kg(fw)	0.00003	DRL Guidance 2013	Table G21	
Pu-240	day/kg(fw)	0.00003	DRL Guidance 2013	Table G21	
Pu-241	day/kg(fw)	0.00003	DRL Guidance 2013	Table G21	
Ra-223	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Ra-224	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Ra-225	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Ra-226	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Ra-228	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
Sr-90	day/kg(fw)	0.069	DRL Guidance 2013	Table G21	
Tc-99	day/kg(fw)	0.014	DRL Guidance 2013	Table G21	estimated as 20x dairy cow Fing
Th-227	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-228	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-229	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-230	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-231	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-232	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
Th-234	day/kg(fw)	0.00029	DRL Guidance 2013	Table G21	
U-233	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
U-234	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
U-235	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
U-236	day/kg(fw)	0.0013	DRL Guidance 2013	Table G21	
U-238	day/kg(fw)	0.0012	DRL Guidance 2013	Table G21	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	16.3	DRL Guidance 2013	Table 4.17	Ι; mean for adult (5950 m3/a)
Soil Intake	kg(dw)/day	0.000004	DRL Guidance 2013	Table 4.18	Is; mean for adult (soil/sediment)
Sediment Intake	kg(dw)/day	0.000004	DRL Guidance 2013	Table 4.18	Is; mean for adult (soil/sediment)
Water Intake	L/day	1.3	DRL Guidance 2013	Sec. 4.15.3	Iw; nursing mother value
Terrestrial Plant Intake	kg(dw)/day	0.481	DRL Guidance 2013	Table G20b	If; sum of central (adult female) dw plant intakes (325.17 g/day) multplied by 1.48 for nursing mother.
Terrestrial Animal Intake	kg(fw)/day	0.661	DRL Guidance 2013	Table G20b	If; sum of central (adult female) animal intakes (446.69 g/day) multplied by 1.48 for nursing mother.
Aquatic Plant Intake	kg(fw)/day	0			
Aquatic Animal Intake	kg(fw)/day	0.0229	DRL Guidance 2013	Table G20b	If; central (adult female) fish intake (15.5 g/day) multplied by 1.48 for nursing mother.
Water Intake Fraction From Drinking	[]	0.495	DRL Guidance 2013	Table 4.14	f(w_w); value for dairy cow; fresh feed scenario
Water Intake Fraction From Plant Feed	[]	0.44	DRL Guidance 2013	Table 4.14	f(w-_pw); value for dairy cow; fresh feed scenario
Water Intake Fraction From Decomposition	[]	0.062	DRL Guidance 2013	Table 4.14	f(w_dw); value for dairy cow; fresh feed scenario
Water Equivalent Of Dry Matter	L/kg(dw)	0.67	DRL Guidance 2013	Sec. 4.8.2	WEa; value for dairy milk
OBT/HTO Ratio From Water Ingestion	[]	0.042	DRL Guidance 2013	Table 4.15	f'OBT; milk cow value
Fraction Of Tritium In OBT Form	[]	0.04	DRL Guidance 2013	Table 4.15	fOBT; milk cow value
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.1	DRL Guidance 2013	Sec. 4.7.1	DWa; value for dairy milk
Stable Carbon Concentration	g-C/kg(fw)	65	DRL Guidance 2013	Table 4.16	X5_C; milk cow value
Fraction of time spent in contaminated air	[]	0	Not Applicable		relevant to animal dose
Fraction of time spent immersed in soil	[]	0	Not Applicable		relevant to animal dose
Fraction of time spent on the soil surface	[]	0	Not Applicable		relevant to animal dose
Fraction of time spent immersed in sediment	[]	0	Not Applicable		relevant to animal dose
Fraction of time spent on the sediment surface	[]	0	Not Applicable		relevant to animal dose

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	933.8	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	933.8	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	45.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	901.6	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	901.6	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	15.35	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	8.851	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	80.13	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	34.26	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	5.502	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	103.7	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	3967	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	3967	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	3967	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	179.1	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	14370	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	31.58	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.02434	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	109.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	109.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	685.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	685.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	19.84	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	19.84	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	1992	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	47.66	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	1.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	1.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	1.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	1.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	14.12	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	14.12	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	14.12	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	14.12	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	14.12	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	8.851	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	5.387	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	173.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	19	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	19	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	19	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	19	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	19	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.9727	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.9727	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	15.71	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	3.741	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	3.741	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	8.979	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	9.727	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	127.2	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.1422	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	3.217	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	164.6	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	16.46	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	16.46	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	16.46	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	104.7	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	14.96	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	50.13	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00195	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	37.41	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	37.41	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	2.843	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	2.843	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.0823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.0823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	82.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	52.37	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.00823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.00823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.00823	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	12.72	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	12.72	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	12.72	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	12.72	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	12.72	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	9.727	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	7.183	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	1.721	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	2.918	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	2.918	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	2.918	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	2.918	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	2.918	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.0067		3-12; Equation [3-20]	Estimated using the a body weight of 4.1 g and the Stahl (1967) allometric relationship: IR (m3/day)=0.002173 wt^0.80 US EPA 1993
Soil Intake	kg(dw)/day	0.0000275	FCSAP (2012)		Default
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.0007	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	0.00138	FCSAP (2012)		Earthworm is a plant. animal ingestion rate in fresh weight was multiplied by the weighted sum of plant moisture content
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Earthworm is a plant
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet; rabbit
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet; rabbit
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet; rabbit
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	fOBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1			OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	Not Applicable		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.0336	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.0336	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.009603	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.00010122	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.00010122	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.00006498	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.001183	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.011592	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.00022654	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.0001881	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.002898	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.006989	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.006989	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.006989	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.00005985	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	0.0576	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.003402	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	5.1291E-06	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.002774	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.002774	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.000964	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.000964	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.001205	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.001205	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	0.02662	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.0003094	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00241	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.00241	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.00241	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.00241	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.0004218	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.0004218	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.0004218	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.0004218	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.0004218	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.001183	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.0005175	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	0.002323	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	0.011718	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	0.011718	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	0.011718	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	0.011718	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	0.011718	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.000035	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.000035	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.0033	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.00000042	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.00000042	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.000038	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.0013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.0184	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.00000094	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.00011	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.000029	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.000029	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.000029	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.000035	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.00006	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.0054	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.00000041	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.00095	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.00095	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.000004	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.000004	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.000005	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.000005	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.0011	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.00034	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00001	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.00001	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.00001	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.00001	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.00038	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.0013	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.00069	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.000023	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.0018	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.0018	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.0018	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.0018	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.0018	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	91	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	2.18	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	89	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	19.8	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.495	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.44	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.062	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.67	CSA N288.1-14	cl. 6.10.3.2	WEa; value for milk
OBT/HTO Ratio From Water Ingestion	[]	0.042	CSA N288.1-14	Table 17	f'OBT; value for cow milk
Fraction Of Tritium In OBT Form	[]	0.04	CSA N288.1-14	Table 17	fOBT; value for cow milk
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.1	CSA N288.1-14	cl. 6.9.2.4	DWa; value for milk
Stable Carbon Concentration	g-C/kg(fw)	65	CSA N288.1-14	Table 18	X5_C; value for milk
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	1.5176E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	2.448E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	1.1532E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	2.75E-08	ICRP 108 (2008)	Table C.1	deer value
Am-243	(uGy/hr)/(Bq/m2)	1.0858E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	6.1429E-12	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
Ca-41	(uGy/hr)/(Bq/m2)	2.3194E-43	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	2.5E-10	ICRP 108 (2008)	Table C.1	deer value
Cm-244	(uGy/hr)/(Bq/m2)	7.8571E-11	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	0.000004042	ICRP 108 (2008)	Table C.1	deer value
Cs-137	(uGy/hr)/(Bq/m2)	9.167E-07	ICRP 108 (2008)	Table C.1	deer value
Eu-152	(uGy/hr)/(Bq/m2)	0.000001833	ICRP 108 (2008)	Table C.1	deer value
Eu-154	(uGy/hr)/(Bq/m2)	0.000002	ICRP 108 (2008)	Table C.1	deer value
Eu-155	(uGy/hr)/(Bq/m2)	7.083E-08	ICRP 108 (2008)	Table C.1	deer value
Fe-55	(uGy/hr)/(Bq/m2)	1.6689E-42	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
I-129	(uGy/hr)/(Bq/m2)	2.458E-08	ICRP 108 (2008)	Table C.1	deer value
Nb-94	(uGy/hr)/(Bq/m2)	0.000002542	ICRP 108 (2008)	Table C.1	deer value
Ni-59	(uGy/hr)/(Bq/m2)	2.6429E-42	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
Np-237	(uGy/hr)/(Bq/m2)	3.083E-08	ICRP 108 (2008)	Table C.1	deer value
Np-239	(uGy/hr)/(Bq/m2)	9.0957E-08	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	2.6885E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	1.2545E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	5.5E-10	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	6.1429E-12	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	2.5E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-239	(uGy/hr)/(Bq/m2)	1.708E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-240	(uGy/hr)/(Bq/m2)	2.417E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-241	(uGy/hr)/(Bq/m2)	2.042E-12	ICRP 108 (2008)	Table C.1	deer value
Ra-223	(uGy/hr)/(Bq/m2)	1.8046E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	1.3033E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	5.7168E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	0.000002833	ICRP 108 (2008)	Table C.1	deer value
Ra-228	(uGy/hr)/(Bq/m2)	1.8357E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	1.208E-13	ICRP 108 (2008)	Table C.1	deer value
Tc-99	(uGy/hr)/(Bq/m2)	-1			
Th-227	(uGy/hr)/(Bq/m2)	2.4474E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	0.000002458	ICRP 108 (2008)	Table C.1	deer value
Th-229	(uGy/hr)/(Bq/m2)	1.083E-07	ICRP 108 (2008)	Table C.1	deer value
Th-230	(uGy/hr)/(Bq/m2)	1.7857E-10	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	2.7406E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	2.75E-10	ICRP 108 (2008)	Table C.1	deer value
Th-234	(uGy/hr)/(Bq/m2)	3.792E-08	ICRP 108 (2008)	Table C.1	deer value
U-233	(uGy/hr)/(Bq/m2)	5.417E-10	ICRP 108 (2008)	Table C.1	deer value
U-234	(uGy/hr)/(Bq/m2)	2.75E-10	ICRP 108 (2008)	Table C.1	deer value
U-235	(uGy/hr)/(Bq/m2)	2.333E-07	ICRP 108 (2008)	Table C.1	deer value
U-236	(uGy/hr)/(Bq/m2)	9.4797E-11	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	1.458E-10	ICRP 108 (2008)	Table C.1	deer value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	6.18E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.24E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.58E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	8.33E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	3.42E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	4.58E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	5.83E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	6.25E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.40E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.1	deer; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	5.00E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.1	deer; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.92E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.0031	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.67E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.44E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.02812	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.08E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.025768	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1248	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1248	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.00873	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.05543	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.05543	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.00581	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.0364	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.08631	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.03374	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.02052	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.0945	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	4.097	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	4.097	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	4.097	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.04617	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	6.912	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.02016	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.00375	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.07096	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.07096	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.14942	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.14942	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.02362	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.02362	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	0.484	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.01092	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.06025	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.06025	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.06025	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.06025	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.00511	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.00511	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.00511	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.00511	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.00511	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.0364	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.00255	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	0.202	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	4.7523	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	4.7523	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	4.7523	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	4.7523	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	4.7523	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.00013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.00013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.003	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.00023	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.0034	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.04	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.137	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.00014	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.012	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.15	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.017	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.017	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.017	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.027	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.0072	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.032	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.0003	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.0243	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.0243	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.00062	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.00062	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	9.8E-05	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	9.8E-05	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.02	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.012	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00025	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.00025	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.00025	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.00025	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.04	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.0034	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.73	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.73	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.73	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.73	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.73	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	18	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.035	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	5.7	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	2.5	CSA N288.1-14	Table G.7	allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.33	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.582	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.081	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	fOBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0	Not Applicable		Special case for honey bee
Am-241	day/kg(fw)	0	Not Applicable		Special case for honey bee
Am-243	day/kg(fw)	0	Not Applicable		Special case for honey bee
Bi-210	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ca-41	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0	Not Applicable		Special case for honey bee
Cm-244	day/kg(fw)	0	Not Applicable		Special case for honey bee
Co-60	day/kg(fw)	0	Not Applicable		Special case for honey bee
Cs-137	day/kg(fw)	0	Not Applicable		Special case for honey bee
Eu-152	day/kg(fw)	0	Not Applicable		Special case for honey bee
Eu-154	day/kg(fw)	0	Not Applicable		Special case for honey bee
Eu-155	day/kg(fw)	0	Not Applicable		Special case for honey bee
Fe-55	day/kg(fw)	0	Not Applicable		Special case for honey bee
Gd-152	day/kg(fw)	0	Not Applicable		Special case for honey bee
HTO	day/kg(fw)	0	Not Applicable		Special case for honey bee
I-129	day/kg(fw)	0	Not Applicable		Special case for honey bee
Nb-94	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ni-59	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ni-63	day/kg(fw)	0	Not Applicable		Special case for honey bee
Np-237	day/kg(fw)	0	Not Applicable		Special case for honey bee
Np-239	day/kg(fw)	0	Not Applicable		Special case for honey bee
OBT	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pa-231	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pa-233	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pb-210	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pu-239	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pu-240	day/kg(fw)	0	Not Applicable		Special case for honey bee
Pu-241	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ra-223	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ra-224	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ra-225	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ra-226	day/kg(fw)	0	Not Applicable		Special case for honey bee
Ra-228	day/kg(fw)	0	Not Applicable		Special case for honey bee
Sr-90	day/kg(fw)	0	Not Applicable		Special case for honey bee
Tc-99	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-227	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-228	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-229	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-230	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-231	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-232	day/kg(fw)	0	Not Applicable		Special case for honey bee
Th-234	day/kg(fw)	0	Not Applicable		Special case for honey bee
U-233	day/kg(fw)	0	Not Applicable		Special case for honey bee
U-234	day/kg(fw)	0	Not Applicable		Special case for honey bee
U-235	day/kg(fw)	0	Not Applicable		Special case for honey bee
U-236	day/kg(fw)	0	Not Applicable		Special case for honey bee
U-238	day/kg(fw)	0	Not Applicable		Special case for honey bee

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Am-241	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Am-243	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Bi-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	Not Applicable		no Fing in honey bee model
Ca-41	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Cm-244	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Co-60	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Cs-137	day/kg(fw)	0.057	CSA N288.1-14	Table G.4	equals CRh
Eu-152	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Eu-154	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Eu-155	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Fe-55	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Gd-152	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
HTO	day/kg(fw)	0	Not Applicable		no Fing in honey bee model
I-129	day/kg(fw)	1.6	CSA N288.1-14	Table G.4	equals CRh
Nb-94	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ni-59	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ni-63	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Np-237	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Np-239	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
OBT	day/kg(fw)	0	Not Applicable		no Fing in honey bee model
Pa-231	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Pa-233	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Pb-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Pu-239	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Pu-240	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Pu-241	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ra-223	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ra-224	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ra-225	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ra-226	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Ra-228	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Sr-90	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Tc-99	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-227	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-228	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-229	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-230	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-231	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-232	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
Th-234	day/kg(fw)	0.1	CSA N288.1-14	cl. 6.10.5.2	equals CRh
U-233	day/kg(fw)	0.41	CSA N288.1-14	Table G.4	equals CRh
U-234	day/kg(fw)	0.41	CSA N288.1-14	Table G.4	equals CRh
U-235	day/kg(fw)	0.41	CSA N288.1-14	Table G.4	equals CRh
U-236	day/kg(fw)	0.41	CSA N288.1-14	Table G.4	equals CRh
U-238	day/kg(fw)	0.41	CSA N288.1-14	Table G.4	equals CRh

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0	Not Applicable		not considered in special case of honey bee
Soil Intake	kg(dw)/day	0	Not Applicable		not considered in special case of honey bee
Sediment Intake	kg(dw)/day	0	Not Applicable		not considered in special case of honey bee
Water Intake	L/day	0	Not Applicable		not considered in special case of honey bee
Terrestrial Plant Intake	kg(dw)/day	1	CSA N288.1-14	cl. 6.10.5.2	set so that Qf x Fing = CRh
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0			special parameterization of honey bee
Water Intake Fraction From Plant Feed	[]	0			special parameterization of honey bee
Water Intake Fraction From Decomposition	[]	10			set so that P45 = 5, since CRh/DWp = 5
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.10.5.2	set equal to WEp for plant on which bee feeds
OBT/HTO Ratio From Water Ingestion	[]	0			
Fraction Of Tritium In OBT Form	[]	0			
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.2	CSA N288.1-14	Table G.5	set equal to DWp for plant on which bee feeds
Stable Carbon Concentration	g-C/kg(fw)	500	CSA N288.1-14	cl. 6.4.9.3	set equal to g-C/kg (dw) of plant so X5c/X4c = CRh=1
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for flying insectl; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for flying insect; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for flying insectl; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for flying insect; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	301.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	301.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	3.655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.908	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.908	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	0.5369	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.05714	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	3.462	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.6432	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	5.208	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	5.341	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	2.875	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	2.875	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	2.875	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	7.517	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	361.7	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.01721	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.01178	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	2.842	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	2.842	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	2.346	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	2.346	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	1.513	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	1.513	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	91.18	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	1.714	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.6962	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.6962	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.6962	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.6962	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.1046	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.1046	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.1046	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.1046	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.1046	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.05714	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	0.9655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	3.171	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	15.33	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	15.33	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	15.33	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	15.33	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	15.33	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.314	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.314	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	1.256	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.00377	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.00377	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	0.314	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.0628	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	5.495	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.00267	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	3.046	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	8.478	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.01193	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.01193	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.01193	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	4.396	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	0.3768	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.02732	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.00094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	0.9733	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	0.9733	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.00973	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.00973	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.00628	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.00628	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	3.768	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	1.884	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.00289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.00289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.00289	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.09419	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.09419	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.09419	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.09419	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.09419	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.0628	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	1.287	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.0314	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	2.355	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	2.355	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	2.355	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	2.355	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	2.355	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.215	Not in DRL Guidance	C.2-17	U.S. EPA, 1993; allometric equation
Soil Intake	kg(dw)/day	0	Not Applicable		aquatic diet for mallard
Sediment Intake	kg(dw)/day	0.000676	Not in DRL Guidance		2% default
Water Intake	L/day	0.034		C.2-17	U.S. EPA, 1993; allometric scaling
Terrestrial Plant Intake	kg(dw)/day	0	Not Applicable		
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		
Aquatic Plant Intake	kg(fw)/day	0		C.2-17	
Aquatic Animal Intake	kg(fw)/day	0.135298		C.2-17	Allometric US EPA, 1993
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0.5			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	48	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	48	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.0013968	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.02651	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.02651	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.0171	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.001365	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.16191	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.0964	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.02052	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.1197	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	12.05	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	12.05	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	12.05	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.04617	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	17.28	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.0189	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.0021267	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.13286	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.13286	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.0964	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.0964	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.08194	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.08194	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	0.3146	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.01001	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.012773	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.012773	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.012773	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.012773	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.009546	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.009546	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.009546	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.009546	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.009546	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.001365	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.003525	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	1.313	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	0.048174	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	0.048174	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	0.048174	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	0.048174	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	0.048174	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.05	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.05	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.00048	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.00011	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.00011	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.257	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.0004	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.012	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.19	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.05	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.05	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.05	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.027	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.018	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.00017	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.0455	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.0455	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.0004	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.0004	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.00034	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.00034	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.013	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.011	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	5.3E-05	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	5.3E-05	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	5.3E-05	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	5.3E-05	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.0086	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.0086	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.0086	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.0086	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.0086	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.0015	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.0047	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.013	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.0074	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.0074	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.0074	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.0074	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.0074	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	13	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.19	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	3.9	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	1.7	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.329	CSA N288.1-14	Table 16	f(w-w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.583	CSA N288.1-14	Table 16	f(w-pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.082	CSA N288.1-14	Table 16	f(w-dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.087	CSA N288.1-14	Table 17	f prime OBT; value for lamb
Fraction Of Tritium In OBT Form	[]	0.08	CSA N288.1-14	Table 17	fOBT; value for lamb
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	275	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	593.7	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	593.7	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	29.07	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	573.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	573.2	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	9.761	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	5.627	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	50.95	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	21.78	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	3.498	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	65.93	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	2522	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	2522	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	2522	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	113.9	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	9133	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	20.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.01547	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	69.45	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	69.45	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	435.6	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	435.6	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	12.61	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	12.61	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	1266	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	30.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	1.261	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	1.261	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	1.261	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	1.261	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	8.976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	8.976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	8.976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	8.976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	8.976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	5.627	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	3.425	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	110.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	12.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	12.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	12.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	12.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	12.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.6184	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.6184	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	9.989	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	2.378	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	2.378	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	5.708	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	6.184	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	80.87	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.09038	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	2.045	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	104.7	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	10.47	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	10.47	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	10.47	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	66.6	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	9.514	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	31.87	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00124	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	23.78	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	23.78	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	1.808	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	1.808	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.05233	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pa-233	day/kg(fw)	0.05233	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	52.33	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	33.3	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00523	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.00523	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.00523	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.00523	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	8.087	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	8.087	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	8.087	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	8.087	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	8.087	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	6.184	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	4.567	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	1.094	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	1.855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	1.855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	1.855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	1.855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	1.855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.0109			Using the inhalation rate allometric equation (US EPA, 1993)
Soil Intake	kg(dw)/day	0	Not Applicable		Based on the Meadow Vole (2.4%)
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.0012			Sample and Suter, 1994
Terrestrial Plant Intake	kg(dw)/day	0.00063	Not Applicable		Sample and Suter, 1994: Earthworm is a plant. Animal ingestion rate in fresh weight was multiplied by the weighted sum of plant moisture content
Terrestrial Animal Intake	kg(fw)/day	0.0037	Not Applicable		Sample and Suter, 1994
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet; rabbit
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet; rabbit
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet; rabbit
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	f OBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1			OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0.5			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	Not Applicable		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	1725	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	1725	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	20.91	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	5.196	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	5.196	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	3.072	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.327	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	19.81	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	3.681	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	29.8	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	30.56	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	16.45	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	16.45	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	16.45	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	43.01	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	2070	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.09848	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.06743	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	16.26	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	16.26	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	13.42	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	13.42	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	8.66	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	8.66	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	521.8	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	9.81	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	3.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	3.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	3.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	3.984	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.5983	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.5983	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.5983	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.5983	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.5983	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.327	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	5.525	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	18.15	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	87.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	87.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	87.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	87.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	87.72	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	1.797	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	1.797	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	7.187	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.02156	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.02156	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	1.797	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.3593	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	31.44	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.01527	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	17.43	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	48.51	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.06828	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.06828	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.06828	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	25.15	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	2.156	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.1563	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.00539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	5.57	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	5.57	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.0557	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.0557	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.03593	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.03593	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	21.56	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	10.78	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.01653	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.01653	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.01653	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.01653	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.539	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.3593	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	7.367	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.1797	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	13.48	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	13.48	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	13.48	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	13.48	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	13.48	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.036			U.S. EPA 1993 (allometric scaling)
Soil Intake	kg(dw)/day	0.000193	FCSAP (2012)		2% default
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.007			US EPA 1993 allometric scalling
Terrestrial Plant Intake	kg(dw)/day	0.00836	Not Applicable		Earthworm is a plant. Animal ingestion rate in fresh weight was multiplied by the weighted sum of plant moisture content.
Terrestrial Animal Intake	kg(fw)/day	0.049			allometric equation
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	187.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	187.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	9.175	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	180.9	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	180.9	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	3.081	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	1.776	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	16.08	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	6.875	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	1.104	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	20.81	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	796	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	796	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	796	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	35.94	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	2883	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	6.337	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00488	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	21.92	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	21.92	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	137.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	137.5	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	3.98	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	3.98	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	399.7	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	9.564	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.398	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.398	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.398	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.398	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	2.833	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	2.833	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	2.833	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	2.833	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	2.833	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	1.776	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	1.081	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	34.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	3.812	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	3.812	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	3.812	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	3.812	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	3.812	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1952	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1952	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	3.153	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	0.7507	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	0.7507	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	1.802	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	1.952	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	25.52	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.02853	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	0.6456	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	33.03	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	3.303	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	3.303	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	3.303	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	21.02	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	3.003	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	10.06	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00039	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	7.507	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	7.507	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	0.5705	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	0.5705	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.01652	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.01652	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	16.52	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	10.51	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00165	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.00165	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.00165	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.00165	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	2.552	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	2.552	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	2.552	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	2.552	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	2.552	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	1.952	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	1.441	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	0.3453	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	0.5855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	0.5855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	0.5855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	0.5855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	0.5855	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.0373			Using the inhalation rate allometric equation (US EPA, 1993)
Soil Intake	kg(dw)/day	0.0000354	FCSAP (2012)		Based on the Meadow Vole (2.4%)
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.0073	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	0.00147	FCSAP (2012)		Food ingestion rate in fresh weight (0.011 kg/d fw) was multiplied by a moisture content of terrestrial and fruit fractions
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet; rabbit
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet; rabbit
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet; rabbit
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	f OBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1			OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	Not Applicable		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	17.56	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	17.56	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.8597	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	16.95	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	16.95	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	0.2887	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.1664	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.507	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.6442	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	0.1034	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	1.95	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	74.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	74.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	74.59	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	3.368	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	270.1	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.5938	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.0004576	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	2.054	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	2.054	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	12.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	12.88	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	37.45	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	0.8962	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.0373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.0373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.0373	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	0.2655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	0.2655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	0.2655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	0.2655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	0.2655	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	0.1664	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	0.1013	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	3.268	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	0.3572	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	0.3572	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	0.3572	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	0.3572	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	0.3572	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.01829	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.01829	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.2954	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	0.07034	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	0.07034	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	0.1688	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.1829	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	2.392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.002673	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	0.0605	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	3.095	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	0.3095	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	0.3095	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	0.3095	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	1.97	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	0.2814	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.9426	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00003658	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	0.7034	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	0.7034	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	0.05346	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	0.05346	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	1.548	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	0.9848	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.0001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.0001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.0001548	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	0.2392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	0.2392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	0.2392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	0.2392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	0.2392	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	0.1829	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	0.1351	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	0.03236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	0.05487	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	0.05487	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	0.05487	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	0.05487	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	0.05487	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.466			Using the inhalation rate allometric equation (US EPA, 1993)
Soil Intake	kg(dw)/day	0	Not Applicable		
Sediment Intake	kg(dw)/day	0.000574	FCSAP (2012)		default rate
Water Intake	L/day	0.025	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	0	Not Applicable		Not Applicable
Terrestrial Animal Intake	kg(fw)/day	0.115	FCSAP (2012)		
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0.115	FCSAP (2012)		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet; rabbit
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet; rabbit
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet; rabbit
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	f OBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1			OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0	Not Applicable		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	Not Applicable		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0.5			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	1.5176E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	2.448E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	1.1532E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	2.75E-08	ICRP 108 (2008)	Table C.1	deer value
Am-243	(uGy/hr)/(Bq/m2)	1.0858E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	6.1429E-12	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
Ca-41	(uGy/hr)/(Bq/m2)	2.3194E-43	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	2.5E-10	ICRP 108 (2008)	Table C.1	deer value
Cm-244	(uGy/hr)/(Bq/m2)	7.8571E-11	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	0.000004042	ICRP 108 (2008)	Table C.1	deer value
Cs-137	(uGy/hr)/(Bq/m2)	9.167E-07	ICRP 108 (2008)	Table C.1	deer value
Eu-152	(uGy/hr)/(Bq/m2)	0.000001833	ICRP 108 (2008)	Table C.1	deer value
Eu-154	(uGy/hr)/(Bq/m2)	0.000002	ICRP 108 (2008)	Table C.1	deer value
Eu-155	(uGy/hr)/(Bq/m2)	7.083E-08	ICRP 108 (2008)	Table C.1	deer value
Fe-55	(uGy/hr)/(Bq/m2)	1.6689E-42	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
I-129	(uGy/hr)/(Bq/m2)	2.458E-08	ICRP 108 (2008)	Table C.1	deer value
Nb-94	(uGy/hr)/(Bq/m2)	0.000002542	ICRP 108 (2008)	Table C.1	deer value
Ni-59	(uGy/hr)/(Bq/m2)	2.6429E-42	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.1	deer value
Np-237	(uGy/hr)/(Bq/m2)	3.083E-08	ICRP 108 (2008)	Table C.1	deer value
Np-239	(uGy/hr)/(Bq/m2)	9.0957E-08	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	2.6885E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	1.2545E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	5.5E-10	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	6.1429E-12	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	2.5E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-239	(uGy/hr)/(Bq/m2)	1.708E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-240	(uGy/hr)/(Bq/m2)	2.417E-10	ICRP 108 (2008)	Table C.1	deer value
Pu-241	(uGy/hr)/(Bq/m2)	2.042E-12	ICRP 108 (2008)	Table C.1	deer value
Ra-223	(uGy/hr)/(Bq/m2)	1.8046E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	1.3033E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	5.7168E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	0.000002833	ICRP 108 (2008)	Table C.1	deer value
Ra-228	(uGy/hr)/(Bq/m2)	1.8357E-06	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	1.208E-13	ICRP 108 (2008)	Table C.1	deer value
Tc-99	(uGy/hr)/(Bq/m2)	-1			
Th-227	(uGy/hr)/(Bq/m2)	2.4474E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	0.000002458	ICRP 108 (2008)	Table C.1	deer value
Th-229	(uGy/hr)/(Bq/m2)	1.083E-07	ICRP 108 (2008)	Table C.1	deer value
Th-230	(uGy/hr)/(Bq/m2)	1.7857E-10	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	2.7406E-07	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	2.75E-10	ICRP 108 (2008)	Table C.1	deer value
Th-234	(uGy/hr)/(Bq/m2)	3.792E-08	ICRP 108 (2008)	Table C.1	deer value
U-233	(uGy/hr)/(Bq/m2)	5.417E-10	ICRP 108 (2008)	Table C.1	deer value
U-234	(uGy/hr)/(Bq/m2)	2.75E-10	ICRP 108 (2008)	Table C.1	deer value
U-235	(uGy/hr)/(Bq/m2)	2.333E-07	ICRP 108 (2008)	Table C.1	deer value
U-236	(uGy/hr)/(Bq/m2)	9.4797E-11	ERICA 1.2.1	Database	Mammal-large; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	1.458E-10	ICRP 108 (2008)	Table C.1	deer value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	6.18E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.24E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.58E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	8.33E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	3.42E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	4.58E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	5.83E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	6.25E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.40E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.1	deer; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	5.00E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.1	deer; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.92E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.50E-04	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.0031	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.67E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.44E-02	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.02812	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.08E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.025768	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-large; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.1	deer; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.16915	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.16915	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.008283	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Am-241	day/kg(fw)	0.16333	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Am-243	day/kg(fw)	0.16333	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Bi-210	day/kg(fw)	0.002781	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.001603	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.014516	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Cm-244	day/kg(fw)	0.006206	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Co-60	day/kg(fw)	0.00099663	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Cs-137	day/kg(fw)	0.018786	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Eu-152	day/kg(fw)	0.71863	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Eu-154	day/kg(fw)	0.71863	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Eu-155	day/kg(fw)	0.71863	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Fe-55	day/kg(fw)	0.032448	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Gd-152	day/kg(fw)	2.602	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.005721	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Nb-94	day/kg(fw)	4.4086E-06	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ni-59	day/kg(fw)	4.4086E-06	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ni-63	day/kg(fw)	0.019789	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Np-237	day/kg(fw)	0.12413	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Np-239	day/kg(fw)	0.12413	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.003593	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Pa-233	day/kg(fw)	0.003593	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Pb-210	day/kg(fw)	0.36081	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.008634	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00035932	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Pu-239	day/kg(fw)	0.00035932	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Pu-240	day/kg(fw)	0.00035932	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Pu-241	day/kg(fw)	0.00035932	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ra-223	day/kg(fw)	0.002558	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ra-224	day/kg(fw)	0.002558	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ra-225	day/kg(fw)	0.002558	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ra-226	day/kg(fw)	0.002558	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Ra-228	day/kg(fw)	0.002558	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Sr-90	day/kg(fw)	0.001603	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Tc-99	day/kg(fw)	0.00097589	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-227	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-228	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-229	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-230	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-231	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-232	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
Th-234	day/kg(fw)	0.031486	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
U-233	day/kg(fw)	0.003441	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
U-234	day/kg(fw)	0.003441	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
U-235	day/kg(fw)	0.003441	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
U-236	day/kg(fw)	0.003441	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight
U-238	day/kg(fw)	0.003441	CSA N288.1-14	Table G.8	Adjusted from TF for Beef based on body weight

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.0001762	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.0001762	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.002846	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Am-241	day/kg(fw)	0.0006777	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Am-243	day/kg(fw)	0.0006777	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Bi-210	day/kg(fw)	0.001626		EcoMetrix Estimation 2017	
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.001762	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.023042	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Cm-244	day/kg(fw)	0.000025753	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Co-60	day/kg(fw)	0.00058282	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Cs-137	day/kg(fw)	0.029819	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Eu-152	day/kg(fw)	0.002982	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Eu-154	day/kg(fw)	0.002982	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Eu-155	day/kg(fw)	0.002982	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Fe-55	day/kg(fw)	0.018976	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Gd-152	day/kg(fw)	0.002711	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.009081	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Nb-94	day/kg(fw)	3.524E-07	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ni-59	day/kg(fw)	0.006777	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.006777	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Np-237	day/kg(fw)	0.00051505	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Np-239	day/kg(fw)	0.00051505	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.000014909	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Pa-233	day/kg(fw)	0.000014909	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Pb-210	day/kg(fw)	0.014909	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.009488	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	1.4909E-06	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Pu-239	day/kg(fw)	1.4909E-06	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Pu-240	day/kg(fw)	1.4909E-06	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Pu-241	day/kg(fw)	1.4909E-06	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ra-223	day/kg(fw)	0.002304	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ra-224	day/kg(fw)	0.002304	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ra-225	day/kg(fw)	0.002304	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ra-226	day/kg(fw)	0.002304	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Ra-228	day/kg(fw)	0.002304	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Sr-90	day/kg(fw)	0.001762	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Tc-99	day/kg(fw)	0.001301	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-227	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-228	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-229	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-230	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-231	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-232	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
Th-234	day/kg(fw)	0.00031174	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
U-233	day/kg(fw)	0.00052861	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
U-234	day/kg(fw)	0.00052861	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
U-235	day/kg(fw)	0.00052861	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
U-236	day/kg(fw)	0.00052861	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight
U-238	day/kg(fw)	0.00052861	CSA N288.1-14	Table G.3	Adjusted from TF for Beef based on body weight

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	65.9			Allometric equation for mammals
Soil Intake	kg(dw)/day	0.12			
Sediment Intake	kg(dw)/day	0.04			
Water Intake	L/day	20	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	6.1	FCSAP (2012)		
Terrestrial Animal Intake	kg(fw)/day	0	FCSAP (2012)		
Aquatic Plant Intake	kg(fw)/day	7.62	FCSAP (2012)		
Aquatic Animal Intake	kg(fw)/day	0	FCSAP (2012)		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.51	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef cow
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	fOBT; value for beef cow
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.07857	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.01783	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.01783	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.00171	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.00228	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.04101	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.00819	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.07011	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.126	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.02362	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.02362	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.02362	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.00513	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	4.416	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.02583	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.0025	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.03358	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.03358	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.01085	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.01085	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.02651	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.02651	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	0.10648	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.00091	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00675	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.00675	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.00675	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.00675	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.00244	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.00244	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.00244	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.00244	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.00244	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.00228	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.00158	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	0.4646	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	0.28644	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	0.28644	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	0.28644	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	0.28644	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	0.28644	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.001	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.001	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.027	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.000074	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.000074	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.001	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	Not Applicable	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.0025	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.0651	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.000034	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.2	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.000098	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.000098	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.000098	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.003	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	Not Applicable	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.0002	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.0115	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.0115	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.000045	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.000045	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	Not Applicable	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.00011	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.00011	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.0044	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.001	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.000028	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.000028	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.000028	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.000028	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.0022	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.0025	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.0021	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.0046	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.044	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.044	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.044	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.044	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.044	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	23	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.0333	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	9	CSA N288.1-14	Table G.7	Qw; value for dry diet
Terrestrial Plant Intake	kg(dw)/day	3.3	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.785	CSA N288.1-14	Table 16	f(w_w); value for dry diet
Water Intake Fraction From Plant Feed	[]	0.043	CSA N288.1-14	Table 16	f(w_pw); value for dry diet
Water Intake Fraction From Decomposition	[]	0.16	CSA N288.1-14	Table 16	f(w_dw); value for dry diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.9	CSA N288.1-14	cl. 6.10.3.2	WEa; value for pork
OBT/HTO Ratio From Water Ingestion	[]	0.15	CSA N288.1-14	Table 17	f'OBT; value for pork
Fraction Of Tritium In OBT Form	[]	0.13	CSA N288.1-14	Table 17	fOBT; value for pork
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.5	CSA N288.1-14	cl. 6.9.2.4	DWa; value for pork
Stable Carbon Concentration	g-C/kg(fw)	304	CSA N288.1-14	Table 18	X5_C; value for pork
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	8.64	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	8.64	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.22989	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.723	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.723	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.171	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.3185	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.323	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	4.338	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.05643	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	0.252	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	3.078	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	144	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	1.512	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.01251	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	1.08624	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	1.08624	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	2.3377	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	2.3377	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	29.04	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	4.641	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.3441	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.3441	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.3441	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.3441	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.3441	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.3185	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	1.425	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	7.161	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	7.161	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	7.161	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	7.161	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	7.161	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.009	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.009	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.079	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.003	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.003	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.35	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	2.1	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.018	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.033	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	0.4	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	1.8	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.15	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	2.4	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.001	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.372	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.372	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.0097	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.0097	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	1.2	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	5.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.35	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	1.9	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	1.1	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	1.1	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	1.1	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	1.1	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	1.1	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.7	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.0051	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	0.25	CSA N288.1-14	Table G.7	Qw; value for dry diet
Terrestrial Plant Intake	kg(dw)/day	0.1	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.765	CSA N288.1-14	Table 16	f(w-w); value for dry diet
Water Intake Fraction From Plant Feed	[]	0.046	CSA N288.1-14	Table 16	f(w-pw); value for dry diet
Water Intake Fraction From Decomposition	[]	0.171	CSA N288.1-14	Table 16	f(w-dw); value for dry diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.84	CSA N288.1-14	cl. 6.10.3.2	WEa; value for eggs
OBT/HTO Ratio From Water Ingestion	[]	0.087	CSA N288.1-14	Table 17	f prime OBT; value for eggs
Fraction Of Tritium In OBT Form	[]	0.08	CSA N288.1-14	Table 17	fOBT; value for eggs
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for eggs
Stable Carbon Concentration	g-C/kg(fw)	157	CSA N288.1-14	Table 18	X5_C; value for eggs
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	1.164	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.171	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.0182	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.1025	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.20485	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	1.6587	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	1.701	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	2.394	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	115.2	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.005481	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.003753	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.9052	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.9052	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.7471	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.7471	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	29.04	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.546	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.0182	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.3075	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.4	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.02	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.75	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.00085	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.97	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	2.7	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	1.4	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.12	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.0087	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.0003	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.0031	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.0031	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	1.2	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.6	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.02	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.41	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.7	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.0051	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	0.25	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	0.1	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.765	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.046	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.171	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	f'OBT; value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	278.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	278.4	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.12222	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.7953	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.7953	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.08208	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.1729	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.2348	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	0.3078	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	69.3	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	57.84	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	57.84	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	57.84	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	0.6669	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	96	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.2898	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.052542	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	1.01032	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	1.01032	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	2.1449	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	2.1449	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.3374	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.3374	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	6.776	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.00637	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.8435	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.8435	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.8435	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.8435	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.07326	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.07326	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.07326	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.07326	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.07326	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.1729	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.03675	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	2.828	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	0.26691	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	0.26691	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	0.26691	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	0.26691	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	0.26691	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.29	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.29	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.042	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.0033	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.0033	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.048	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.19	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.96	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.18	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	110	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.24	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.24	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.24	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	0.39	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.1	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.46	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.0042	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.346	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.346	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.0089	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.0089	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.0014	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.0014	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	0.28	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.007	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0035	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.0035	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.0035	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.0035	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.066	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.066	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.066	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.066	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.066	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.19	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.049	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.028	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.041	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.9	CSA N288.1-14	Table G.7	Qa; allometric value
Soil Intake	kg(dw)/day	0.017	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Sediment Intake	kg(dw)/day	0	CSA N288.1-14	Table G.7	
Water Intake	L/day	0.36	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	0.11	CSA N288.1-14	Table G.7	Qf; allometric value
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		Applicable only to "nursing mother"
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef cow
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	fOBT; value for beef cow
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	1	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.05E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.30E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.2	rat value
Am-243	(uGy/hr)/(Bq/m2)	2.43E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.2	rat value
Ca-41	(uGy/hr)/(Bq/m2)	6.07E-43	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.2	rat value
Cm-244	(uGy/hr)/(Bq/m2)	2.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.92E-06	ICRP 108 (2008)	Table C.2	rat value
Cs-137	(uGy/hr)/(Bq/m2)	1.88E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-152	(uGy/hr)/(Bq/m2)	3.67E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-154	(uGy/hr)/(Bq/m2)	3.92E-06	ICRP 108 (2008)	Table C.2	rat value
Eu-155	(uGy/hr)/(Bq/m2)	1.79E-07	ICRP 108 (2008)	Table C.2	rat value
Fe-55	(uGy/hr)/(Bq/m2)	4.37E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
I-129	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.2	rat value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.2	rat value
Ni-59	(uGy/hr)/(Bq/m2)	7.14E-42	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.2	rat value
Np-237	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.2	rat value
Np-239	(uGy/hr)/(Bq/m2)	5.66E-08	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	Not Applicable		not in soil
Pa-231	(uGy/hr)/(Bq/m2)	5.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.63E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-239	(uGy/hr)/(Bq/m2)	4.17E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.2	rat value
Pu-241	(uGy/hr)/(Bq/m2)	5.00E-12	ICRP 108 (2008)	Table C.2	rat value
Ra-223	(uGy/hr)/(Bq/m2)	3.76E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.33E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.15E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.2	rat value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.42E-13	ICRP 108 (2008)	Table C.2	rat value
Tc-99	(uGy/hr)/(Bq/m2)	-1.00E+00			
Th-227	(uGy/hr)/(Bq/m2)	5.12E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.2	rat value
Th-229	(uGy/hr)/(Bq/m2)	2.54E-07	ICRP 108 (2008)	Table C.2	rat value
Th-230	(uGy/hr)/(Bq/m2)	4.93E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.77E-07	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.2	rat value
Th-234	(uGy/hr)/(Bq/m2)	7.92E-08	ICRP 108 (2008)	Table C.2	rat value
U-233	(uGy/hr)/(Bq/m2)	1.29E-09	ICRP 108 (2008)	Table C.2	rat value
U-234	(uGy/hr)/(Bq/m2)	7.50E-10	ICRP 108 (2008)	Table C.2	rat value
U-235	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.2	rat value
U-236	(uGy/hr)/(Bq/m2)	4.05E-10	ERICA 1.2.1	Database	Mammal-small-burrowing; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.2	rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.03E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.06E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-06	ICRP 108 (2008)	Table C.2	a rat value
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.31E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	Not Applicable		
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.86E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-08	ICRP 108 (2008)	Table C.2	a rat value
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.30E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.001208	ICRP 108 (2008)	Table C.2	a rat value
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.83E-03	ICRP 108 (2008)	Table C.2	a rat value
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.42E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.83E-04	ICRP 108 (2008)	Table C.2	a rat value
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.50E-05	ICRP 108 (2008)	Table C.2	a rat value
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.94E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ERICA 1.2.1	Database	Mammal-small-burrowing
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.04E-06	ICRP 108 (2008)	Table C.2	a rat value
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.92E-04	ICRP 108 (2008)	Table C.2	a rat value
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.20E-08	ERICA 1.2.1	Database	Mammal-small-burrowing
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-06	ICRP 108 (2008)	Table C.2	a rat value
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.03E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	0	ICRP 108 (2008)	Table C.2	a rat value
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.82E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.38E-05	ERICA 1.2.1	Database	Mammal-small-burrowing
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.20E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	4.30E-09	ERICA 1.2.1	Database	Mammal-small-burrowing
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.38E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.08E-08	ICRP 108 (2008)	Table C.2	a rat value
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.33E-07	ICRP 108 (2008)	Table C.2	a rat value
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	5.00E-10	ICRP 108 (2008)	Table C.2	a rat value
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.22E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	9.00E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	3.88E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	8.33E-04	ICRP 108 (2008)	Table C.2	a rat value
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.21E-03	ERICA 1.2.1	Database	Mammal-small-burrowing
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-10	ICRP 108 (2008)	Table C.2	a rat value
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	0.00E+00	ICRP 108 (2008)	Table C.2	a rat value
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.65E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	7.50E-04	ICRP 108 (2008)	Table C.2	a rat value
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	2.63E-05	ICRP 108 (2008)	Table C.2	a rat value
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.80E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.86E-04	ERICA 1.2.1	Database	Mammal-small-burrowing
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.25E-07	ICRP 108 (2008)	Table C.2	a rat value
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.08E-05	ICRP 108 (2008)	Table C.2	a rat value
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.83E-07	ICRP 108 (2008)	Table C.2	a rat value
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.46E+05	ICRP 108 (2008)	Table C.2	a rat value
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	6.25E-05	ICRP 108 (2008)	Table C.2	a rat value
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.23E-07	ERICA 1.2.1	Database	Mammal-small-burrowing
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	1.00E-07	ICRP 108 (2008)	Table C.2	a rat value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	0.1591	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	1.29E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	0.03179	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.20E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.59E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	1.54E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	1.67E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	1.71E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	1.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.08E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.37E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	1.75E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	1.00E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.63E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.2	rat; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.87E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	1.27E-04	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	2.42E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	3.17E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	2.96E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	4.39E-01	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.41E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	3.29E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	5.83E-05	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	3.37E-02	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	1.87E-01	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.02708	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	1.04E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	5.00E-04	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	2.79E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	2.75E-02	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	0.02547	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Mammal-small burrowing; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.2	rat; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	5.559	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	5.559	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.2722	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	5.367	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	5.367	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	0.0914	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.05269	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.4771	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.204	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	0.03275	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	0.6174	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	23.62	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	23.62	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	23.62	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	1.066	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	85.52	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.188	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	0.00014	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	0.6503	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	0.6503	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	4.079	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	4.079	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.1181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.1181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	11.86	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	0.2837	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.01181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	0.01181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	0.01181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	0.01181	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	0.08405	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	0.08405	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	0.08405	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	0.08405	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	0.08405	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	0.05269	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	0.03207	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	1.035	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	0.1131	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	0.1131	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	0.1131	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	0.1131	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	0.1131	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.005791	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.005791	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.09354	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-241	day/kg(fw)	0.02227	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Am-243	day/kg(fw)	0.02227	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Bi-210	day/kg(fw)	0.05345	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.05791	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.7572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cm-244	day/kg(fw)	0.0008463	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Co-60	day/kg(fw)	0.01915	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Cs-137	day/kg(fw)	0.9799	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-152	day/kg(fw)	0.09799	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-154	day/kg(fw)	0.09799	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Eu-155	day/kg(fw)	0.09799	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Fe-55	day/kg(fw)	0.6236	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Gd-152	day/kg(fw)	0.08909	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.2984	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Nb-94	day/kg(fw)	1.158E-05	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-59	day/kg(fw)	0.2227	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ni-63	day/kg(fw)	0.2227	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-237	day/kg(fw)	0.01693	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Np-239	day/kg(fw)	0.01693	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.00049	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pa-233	day/kg(fw)	0.00049	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pb-210	day/kg(fw)	0.49	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Po-210	day/kg(fw)	0.3118	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	4.9E-05	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-239	day/kg(fw)	4.9E-05	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-240	day/kg(fw)	4.9E-05	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Pu-241	day/kg(fw)	4.9E-05	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-223	day/kg(fw)	0.07572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-224	day/kg(fw)	0.07572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-225	day/kg(fw)	0.07572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-226	day/kg(fw)	0.07572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Ra-228	day/kg(fw)	0.07572	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Sr-90	day/kg(fw)	0.05791	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Tc-99	day/kg(fw)	0.04276	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-227	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-228	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-229	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-230	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-231	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-232	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
Th-234	day/kg(fw)	0.01024	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-233	day/kg(fw)	0.01737	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-234	day/kg(fw)	0.01737	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-235	day/kg(fw)	0.01737	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-236	day/kg(fw)	0.01737	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.
U-238	day/kg(fw)	0.01737	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for beef to estimate the transfer factor for the mammal receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	1.588			Using the inhalation rate allometric equation (US EPA, 1993)
Soil Intake	kg(dw)/day	0.00235	FCSAP (2012)		Based on the Red Fox (2.8%)
Sediment Intake	kg(dw)/day	0	Not Applicable		
Water Intake	L/day	0.34	FCSAP (2012)		
Terrestrial Plant Intake	kg(dw)/day	0.0556	FCSAP (2012)		Earthworm is a plant. Animal ingestion rate in fresh weight was multiplied by the weighted sum of plant moisture content.
Terrestrial Animal Intake	kg(fw)/day	0.342	FCSAP (2012)		
Aquatic Plant Intake	kg(fw)/day	0	Not Applicable		
Aquatic Animal Intake	kg(fw)/day	0	Not Applicable		
Water Intake Fraction From Drinking	[]	0.413	CSA N288.1-14	Table 16	f(w_w); value for fresh diet; rabbit
Water Intake Fraction From Plant Feed	[]	0.509	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet; rabbit
Water Intake Fraction From Decomposition	[]	0.071	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet; rabbit
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for beef cow
OBT/HTO Ratio From Water Ingestion	[]	0.12	CSA N288.1-14	Table 17	f'OBT; value for beef
Fraction Of Tritium In OBT Form	[]	0.11	CSA N288.1-14	Table 17	f OBT; value for beef
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for beef cow
Stable Carbon Concentration	g-C/kg(fw)	201	CSA N288.1-14	Table 18	X5_C; value for beef
Fraction of time spent in contaminated air	[]	1		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4	
Fraction of time spent immersed in soil	[]	0.2		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3	
Fraction of time spent on the soil surface	[]	0.8		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3	
Fraction of time spent immersed in sediment	[]	0	Not Applicable	OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3	
Fraction of time spent on the sediment surface	[]	0	Not Applicable	OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	28.29	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	28.29	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.343	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.08522	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.08522	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	0.05039	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.00536	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.3249	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.06036	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	0.4888	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	0.5012	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.2699	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.2699	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.2699	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	0.7054	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	33.94	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.00162	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.00111	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	0.2667	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	0.2667	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.2201	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.2201	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.142	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.142	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	8.557	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.1609	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.06533	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.06533	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.06533	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.06533	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.00981	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.00981	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.00981	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.00981	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.00981	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.00536	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	0.09061	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.2976	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	1.439	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	1.439	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	1.439	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	1.439	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	1.439	CSA N288.1-14	Table G.3 x G.8	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.02947	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.02947	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.1179	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-241	day/kg(fw)	0.0003536	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Am-243	day/kg(fw)	0.0003536	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Bi-210	day/kg(fw)	0.02947	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.005893	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	0.5157	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cm-244	day/kg(fw)	0.0002505	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Co-60	day/kg(fw)	0.2858	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Cs-137	day/kg(fw)	0.7956	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-152	day/kg(fw)	0.00112	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-154	day/kg(fw)	0.00112	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Eu-155	day/kg(fw)	0.00112	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Fe-55	day/kg(fw)	0.4125	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Gd-152	day/kg(fw)	0.03536	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.002564	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Nb-94	day/kg(fw)	0.0000884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-59	day/kg(fw)	0.09134	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ni-63	day/kg(fw)	0.09134	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-237	day/kg(fw)	0.0009134	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Np-239	day/kg(fw)	0.0009134	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.0005893	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pa-233	day/kg(fw)	0.0005893	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Pb-210	day/kg(fw)	0.3536	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.1768	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.0002711	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-239	day/kg(fw)	0.0002711	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-240	day/kg(fw)	0.0002711	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Pu-241	day/kg(fw)	0.0002711	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-223	day/kg(fw)	0.00884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-224	day/kg(fw)	0.00884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-225	day/kg(fw)	0.00884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-226	day/kg(fw)	0.00884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Ra-228	day/kg(fw)	0.00884	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Sr-90	day/kg(fw)	0.005893	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Tc-99	day/kg(fw)	0.1208	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-227	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-228	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-229	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-230	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-231	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-232	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
Th-234	day/kg(fw)	0.002947	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-233	day/kg(fw)	0.221	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-234	day/kg(fw)	0.221	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-235	day/kg(fw)	0.221	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-236	day/kg(fw)	0.221	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.
U-238	day/kg(fw)	0.221	CSA N288.1-14	Table G.3	An allometric equation (transfer proportional to a -3/4 power of body weight) was applied to transfer factors available for poultry to estimate the transfer factor for the bird receptor.

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	2.445		C.2-17	U.S. EPA, 1993; allometric equation
Soil Intake	kg(dw)/day	0	Not Applicable		aquatic diet for mallard
Sediment Intake	kg(dw)/day	0.00527			default (2%)
Water Intake	L/day	0.28		C.2-17	U.S. EPA, 1993; allometric scaling
Terrestrial Plant Intake	kg(dw)/day	0	Not Applicable		
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		
Aquatic Plant Intake	kg(fw)/day	1.05		C.2-17	US EPA (1993) allometric equation
Aquatic Animal Intake	kg(fw)/day	0		C.2-17	
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0.5			OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.89E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.18E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.4	duck value
Am-243	(uGy/hr)/(Bq/m2)	2.30E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.2143E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Ca-41	(uGy/hr)/(Bq/m2)	5.88E-43	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.4	duck value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	7.50E-06	ICRP 108 (2008)	Table C.4	duck value
Cs-137	(uGy/hr)/(Bq/m2)	1.79E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-152	(uGy/hr)/(Bq/m2)	3.46E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-154	(uGy/hr)/(Bq/m2)	3.75E-06	ICRP 108 (2008)	Table C.4	duck value
Eu-155	(uGy/hr)/(Bq/m2)	1.67E-05	ICRP 108 (2008)	Table C.4	duck value
Fe-55	(uGy/hr)/(Bq/m2)	4.2316E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/m2)	6.25E-07	ICRP 108 (2008)	Table C.4	duck value
Nb-94	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ni-59	(uGy/hr)/(Bq/m2)	7.1429E-42	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Np-237	(uGy/hr)/(Bq/m2)	7.08E-08	ICRP 108 (2008)	Table C.4	duck value
Np-239	(uGy/hr)/(Bq/m2)	1.8782E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Pa-231	(uGy/hr)/(Bq/m2)	5.38E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.47E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.00E-09	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-239	(uGy/hr)/(Bq/m2)	4.13E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-240	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Pu-241	(uGy/hr)/(Bq/m2)	4.58E-12	ICRP 108 (2008)	Table C.4	duck value
Ra-223	(uGy/hr)/(Bq/m2)	3.54E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.24E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.09E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.4	duck value
Ra-228	(uGy/hr)/(Bq/m2)	3.43E-06	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.25E-13	ICRP 108 (2008)	Table C.4	duck value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.4	duck value
Th-227	(uGy/hr)/(Bq/m2)	4.90E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	4.17E-06	ICRP 108 (2008)	Table C.4	duck value
Th-229	(uGy/hr)/(Bq/m2)	2.42E-07	ICRP 108 (2008)	Table C.4	duck value
Th-230	(uGy/hr)/(Bq/m2)	5.00E-10	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	5.53E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	6.67E-10	ICRP 108 (2008)	Table C.4	duck value
Th-234	(uGy/hr)/(Bq/m2)	7.50E-08	ICRP 108 (2008)	Table C.4	duck value
U-233	(uGy/hr)/(Bq/m2)	1.21E-09	ICRP 108 (2008)	Table C.4	duck value
U-234	(uGy/hr)/(Bq/m2)	7.08E-10	ICRP 108 (2008)	Table C.4	duck value
U-235	(uGy/hr)/(Bq/m2)	5.00E-07	ICRP 108 (2008)	Table C.4	duck value
U-236	(uGy/hr)/(Bq/m2)	1.39E-07	ERICA 1.2.1	Database	Bird; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.875E-10	ICRP 108 (2008)	Table C.4	duck value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil or sediment))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	0			
Ac-227	(uGy/hr)/(Bq/m3)	0			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw animal))	1.59E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw animal))	4.02E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw animal))	0.00018057	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw animal))	3.18E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw animal))	3.06E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw animal))	2.22E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw animal))	2.83E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw animal))	1.5883E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw animal))	0.033	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw animal))	0.0002375	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw animal))	0.0001875	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw animal))	0.0001583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw animal))	2.63E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw animal))	4.17E-05	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw animal))	3.38E-06	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw animal))	1.24E-02	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw animal))	0.00004583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw animal))	2.21E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw animal))	4.00E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw animal))	0.000004	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw animal))	2.74E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw animal))	1.69E-04	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw animal))	5.76E-06	ICRP 108 (2008)	Table C.4	duck; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw animal))	2.86E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw animal))	0.00013405	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw animal))	0.00024583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw animal))	0.030417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw animal))	0.03167	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw animal))	0.02958	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw animal))	3.00E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw animal))	3.64E-06	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw animal))	1.53E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw animal))	1.61E-01	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw animal))	0.43864	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw animal))	1.39E-01	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw animal))	0.0003583	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw animal))	6.25E-04	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw animal))	0.00005833	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw animal))	0.033694	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw animal))	0.1865	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw animal))	0.027974	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw animal))	0.027	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw animal))	0.0001042	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw animal))	0.02333	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw animal))	0.0005	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw animal))	0.02792	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw animal))	0.0275	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw animal))	2.55E-02	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw animal))	0.025993	ERICA 1.2.1	Database	Bird; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw animal))	0.02417	ICRP 108 (2008)	Table C.4	duck; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	96	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	1.164	CSA N288.1-14	Table G.3 x G.8	
Am-241	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Am-243	day/kg(fw)	0.2892	CSA N288.1-14	Table G.3 x G.8	
Bi-210	day/kg(fw)	0.171	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Ca-41	day/kg(fw)	0.0182	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.1025	CSA N288.1-14	Table G.3 x G.8	
Cm-244	day/kg(fw)	0.20485	CSA N288.1-14	Table G.3 x G.8	
Co-60	day/kg(fw)	1.6587	CSA N288.1-14	Table G.3 x G.8	
Cs-137	day/kg(fw)	1.701	CSA N288.1-14	Table G.3 x G.8	
Eu-152	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-154	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Eu-155	day/kg(fw)	0.9158	CSA N288.1-14	Table G.3 x G.8	
Fe-55	day/kg(fw)	2.394	CSA N288.1-14	Table G.3 x G.8	
Gd-152	day/kg(fw)	115.2	CSA N288.1-14	Table G.3 x G.8	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
I-129	day/kg(fw)	0.005481	CSA N288.1-14	Table G.3 x G.8	
Nb-94	day/kg(fw)	0.003753	CSA N288.1-14	Table G.3 x G.8	
Ni-59	day/kg(fw)	0.9052	CSA N288.1-14	Table G.3 x G.8	
Ni-63	day/kg(fw)	0.9052	CSA N288.1-14	Table G.3 x G.8	
Np-237	day/kg(fw)	0.7471	CSA N288.1-14	Table G.3 x G.8	
Np-239	day/kg(fw)	0.7471	CSA N288.1-14	Table G.3 x G.8	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3 x G.8	handled by specific activity model
Pa-231	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pa-233	day/kg(fw)	0.482	CSA N288.1-14	Table G.3 x G.8	
Pb-210	day/kg(fw)	29.04	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.546	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-239	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-240	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Pu-241	day/kg(fw)	0.22172	CSA N288.1-14	Table G.3 x G.8	
Ra-223	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-224	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-225	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-226	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Ra-228	day/kg(fw)	0.0333	CSA N288.1-14	Table G.3 x G.8	
Sr-90	day/kg(fw)	0.0182	CSA N288.1-14	Table G.3 x G.8	
Tc-99	day/kg(fw)	0.3075	CSA N288.1-14	Table G.3 x G.8	
Th-227	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-228	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-229	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-230	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-231	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-232	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
Th-234	day/kg(fw)	1.01	CSA N288.1-14	Table G.3 x G.8	
U-233	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-234	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-235	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-236	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	
U-238	day/kg(fw)	4.8825	CSA N288.1-14	Table G.3 x G.8	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	day/kg(fw)	0.4	CSA N288.1-14	Table G.3	
Am-241	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Am-243	day/kg(fw)	0.0012	CSA N288.1-14	Table G.3	
Bi-210	day/kg(fw)	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Ca-41	day/kg(fw)	0.02	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	day/kg(fw)	1.75	CSA N288.1-14	Table G.3	
Cm-244	day/kg(fw)	0.00085	CSA N288.1-14	Table G.3	
Co-60	day/kg(fw)	0.97	CSA N288.1-14	Table G.3	
Cs-137	day/kg(fw)	2.7	CSA N288.1-14	Table G.3	
Eu-152	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-154	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Eu-155	day/kg(fw)	0.0038	CSA N288.1-14	Table G.3	
Fe-55	day/kg(fw)	1.4	CSA N288.1-14	Table G.3	
Gd-152	day/kg(fw)	0.12	CSA N288.1-14	Table G.3	
HTO	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
I-129	day/kg(fw)	0.0087	CSA N288.1-14	Table G.3	
Nb-94	day/kg(fw)	0.0003	CSA N288.1-14	Table G.3	
Ni-59	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Ni-63	day/kg(fw)	0.31	CSA N288.1-14	Table G.3	
Np-237	day/kg(fw)	0.0031	CSA N288.1-14	Table G.3	
Np-239	day/kg(fw)	0.0031	CSA N288.1-14	Table G.3	
OBT	day/kg(fw)	0	CSA N288.1-14	Table G.3	handled by specific activity model
Pa-231	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pa-233	day/kg(fw)	0.002	CSA N288.1-14	Table G.3	
Pb-210	day/kg(fw)	1.2	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	day/kg(fw)	0.6	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-239	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-240	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Pu-241	day/kg(fw)	0.00092	CSA N288.1-14	Table G.3	
Ra-223	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-224	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-225	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-226	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Ra-228	day/kg(fw)	0.03	CSA N288.1-14	Table G.3	
Sr-90	day/kg(fw)	0.02	CSA N288.1-14	Table G.3	
Tc-99	day/kg(fw)	0.41	CSA N288.1-14	Table G.3	
Th-227	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-228	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-229	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-230	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-231	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-232	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
Th-234	day/kg(fw)	0.01	CSA N288.1-14	Table G.3	
U-233	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-234	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-235	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-236	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	
U-238	day/kg(fw)	0.75	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Air Intake	m3/day	0.45	CSA N288.1-14	Table G.7	Qa; allometric value for mallard
Soil Intake	kg(dw)/day	0	Not Applicable		aquatic diet for mallard
Sediment Intake	kg(dw)/day	0.0012	CSA N288.1-14	Table G.7	Qf*fsl+Qs
Water Intake	L/day	0.06	CSA N288.1-14	Table G.7	Qw; value for fresh diet
Terrestrial Plant Intake	kg(dw)/day	0	Not Applicable		
Terrestrial Animal Intake	kg(fw)/day	0	Not Applicable		
Aquatic Plant Intake	kg(fw)/day	0.24	CSA N288.1-14	Table G.7	DW intake/dry weight fraction
Aquatic Animal Intake	kg(fw)/day	0.24	CSA N288.1-14	Table G.7	DW intake/dry weight fraction
Water Intake Fraction From Drinking	[]	0.22	CSA N288.1-14	Table 16	f(w_w); value for fresh diet
Water Intake Fraction From Plant Feed	[]	0.65	CSA N288.1-14	Table 16	f(w_pw); value for fresh diet
Water Intake Fraction From Decomposition	[]	0.121	CSA N288.1-14	Table 16	f(w_dw); value for fresh diet
Water Equivalent Of Dry Matter	L/kg(dw)	0.8	CSA N288.1-14	cl. 6.10.3.2	WEa; value for poultry
OBT/HTO Ratio From Water Ingestion	[]	0.11	CSA N288.1-14	Table 17	value for poultry
Fraction Of Tritium In OBT Form	[]	0.1	CSA N288.1-14	Table 17	fOBT; value for poultry
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.3	CSA N288.1-14	cl. 6.9.2.4	DWa; value for poultry
Stable Carbon Concentration	g-C/kg(fw)	244	CSA N288.1-14	Table 18	X5_C; value for poultry
Fraction of time spent in contaminated air	[]	1	EcoMetrix Suggestion 2014		OFa; for noble gas dose; dose eq'n N288.6 cl. 7.3.4.1.4
Fraction of time spent immersed in soil	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the soil surface	[]	0	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent immersed in sediment	[]	0	EcoMetrix Suggestion 2014		OFs; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3
Fraction of time spent on the sediment surface	[]	0.5	EcoMetrix Suggestion 2014		OFss; value for upland animal; dose eq'n N288.6 cl. 7.3.4.1.3

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.49E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.25E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	1.85E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	9.17E-08	ICRP 108 (2008)	Table C.19	pine tree value
Am-243	(uGy/hr)/(Bq/m2)	2.06E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.00E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	pine tree value
Ca-41	(uGy/hr)/(Bq/m2)	1.61E-15	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	3.54E-10	ICRP 108 (2008)	Table C.19	pine tree value
Cm-244	(uGy/hr)/(Bq/m2)	7.86E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.19	pine tree value
Cs-137	(uGy/hr)/(Bq/m2)	1.29E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-152	(uGy/hr)/(Bq/m2)	2.67E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-154	(uGy/hr)/(Bq/m2)	2.83E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-155	(uGy/hr)/(Bq/m2)	1.63E-07	ICRP 108 (2008)	Table C.19	pine tree value
Fe-55	(uGy/hr)/(Bq/m2)	1.16E-14	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.19	pine tree value
I-129	(uGy/hr)/(Bq/m2)	1.17E-07	ICRP 108 (2008)	Table C.19	pine tree value
Nb-94	(uGy/hr)/(Bq/m2)	3.63E-06	ICRP 108 (2008)	Table C.19	pine tree value
Ni-59	(uGy/hr)/(Bq/m2)	1.93E-14	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.19	pine tree value
Np-237	(uGy/hr)/(Bq/m2)	9.17E-08	ICRP 108 (2008)	Table C.19	pine tree value
Np-239	(uGy/hr)/(Bq/m2)	1.68E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	not in soil
Pa-231	(uGy/hr)/(Bq/m2)	4.65E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.17E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.00E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	4.17E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-239	(uGy/hr)/(Bq/m2)	1.75E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-240	(uGy/hr)/(Bq/m2)	4.08E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-241	(uGy/hr)/(Bq/m2)	6.25E-12	ICRP 108 (2008)	Table C.19	pine tree value
Ra-223	(uGy/hr)/(Bq/m2)	3.10E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	1.88E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	9.41E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	3.88E-06	ICRP 108 (2008)	Table C.19	pine tree value
Ra-228	(uGy/hr)/(Bq/m2)	2.71E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.75E-12	ICRP 108 (2008)	Table C.19	pine tree value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	pine tree value
Th-227	(uGy/hr)/(Bq/m2)	4.24E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	3.25E-06	ICRP 108 (2008)	Table C.19	pine tree value
Th-229	(uGy/hr)/(Bq/m2)	2.25E-07	ICRP 108 (2008)	Table C.19	pine tree value
Th-230	(uGy/hr)/(Bq/m2)	3.14E-10	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	4.75E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	2.13E-09	ICRP 108 (2008)	Table C.19	pine tree value
Th-234	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.19	pine tree value
U-233	(uGy/hr)/(Bq/m2)	2.75E-09	ICRP 108 (2008)	Table C.19	pine tree value
U-234	(uGy/hr)/(Bq/m2)	3.38E-09	ICRP 108 (2008)	Table C.19	pine tree value
U-235	(uGy/hr)/(Bq/m2)	4.58E-07	ICRP 108 (2008)	Table C.19	pine tree value
U-236	(uGy/hr)/(Bq/m2)	7.88E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	2.63E-09	ICRP 108 (2008)	Table C.19	pine tree value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	-1			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15917	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	5.74E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.07E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	2.24E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.59E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.58E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.033	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	7.50E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	3.25E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	4.13E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	5.42E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	6.25E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	3.40E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.19	pine tree; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	5.00E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	5.83E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	4.00E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	2.20E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.19	pine tree; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	1.91E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.50E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.53E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.61E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.39E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.41E-01	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	5.83E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	6.67E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.44E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.87E-01	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.02812	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	1.08E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02333	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	5.00E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.025768	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025993	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Am-241	[]	1	CSA N288.1-14	Table G.3	
Am-243	[]	1	CSA N288.1-14	Table G.3	
Bi-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	1	CSA N288.1-14	Table G.3	
Co-60	[]	1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	1	CSA N288.1-14	Table G.3	
Eu-154	[]	1	CSA N288.1-14	Table G.3	
Eu-155	[]	1	CSA N288.1-14	Table G.3	
Fe-55	[]	1	CSA N288.1-14	Table G.3	
Gd-152	[]	1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	1	CSA N288.1-14	Table G.3	
Nb-94	[]	1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	1	CSA N288.1-14	Table G.3	
Np-239	[]	1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	1	CSA N288.1-14	Table G.3	
Pa-233	[]	1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	1	CSA N288.1-14	Table G.3	
Pu-239	[]	1	CSA N288.1-14	Table G.3	
Pu-240	[]	1	CSA N288.1-14	Table G.3	
Pu-241	[]	1	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	1	CSA N288.1-14	Table G.3	
Th-228	[]	1	CSA N288.1-14	Table G.3	
Th-229	[]	1	CSA N288.1-14	Table G.3	
Th-230	[]	1	CSA N288.1-14	Table G.3	
Th-231	[]	1	CSA N288.1-14	Table G.3	
Th-232	[]	1	CSA N288.1-14	Table G.3	
Th-234	[]	1	CSA N288.1-14	Table G.3	
U-233	[]	1	CSA N288.1-14	Table G.3	
U-234	[]	1	CSA N288.1-14	Table G.3	
U-235	[]	1	CSA N288.1-14	Table G.3	
U-236	[]	1	CSA N288.1-14	Table G.3	
U-238	[]	1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	61	Not in DRL Guidance	NNP He et al., 2012 and dry matter from Ximenes et al., 2004	The net primary productivity was calculated as 6 tonnes of carbon per hectar per year which is 185 kg fw/m2/yr with carbon making up 33% of dry matter of a tree.
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	365	Not in DRL Guidance	EcoMetrix Suggestion	Leaves persist for mutliple years
Foliar Interception Fraction	[]	1	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for forage and wild plants
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	0.33	Not in DRL Guidance	He et al. 2012	Fir value
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	6	Not in DRL Guidance	He et al., 2012	Used value of mature spruce-fir forest as surrogate
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.44	Not in DRL Guidance	Van Wagner, 1961	based on balsam fir values. moisture/dry matter = 1.26, therefore (matter+dry matter) / dry matter =2.26. Therefore matter / (matter+dry matter)=0.56 and DWp=1-0.56
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	-1			
Ac-227	(uGy/hr)/(Bq/m2)	-1			
Ag-108m	(uGy/hr)/(Bq/m2)	-1			
Am-241	(uGy/hr)/(Bq/m2)	2.25E-06	ICRP 108 (2008)	Table C.20	grass value
Am-243	(uGy/hr)/(Bq/m2)	-1			
Bi-210	(uGy/hr)/(Bq/m2)	-1			
C-14	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Ca-41	(uGy/hr)/(Bq/m2)	-1			
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.20	grass value
Cm-244	(uGy/hr)/(Bq/m2)	3.00E-07	ICRP 108 (2008)	Table C.20	grass value
Co-60	(uGy/hr)/(Bq/m2)	1.79E-05	ICRP 108 (2008)	Table C.20	grass value
Cs-137	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-152	(uGy/hr)/(Bq/m2)	9.17E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-154	(uGy/hr)/(Bq/m2)	9.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-155	(uGy/hr)/(Bq/m2)	7.08E-07	ICRP 108 (2008)	Table C.20	grass value
Fe-55	(uGy/hr)/(Bq/m2)	-1			
Gd-152	(uGy/hr)/(Bq/m2)	-1			
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
I-129	(uGy/hr)/(Bq/m2)	9.17E-07	ICRP 108 (2008)	Table C.20	grass value
Nb-94	(uGy/hr)/(Bq/m2)	1.21E-05	ICRP 108 (2008)	Table C.20	grass value
Ni-59	(uGy/hr)/(Bq/m2)	-1			
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Np-237	(uGy/hr)/(Bq/m2)	2.29E-06	ICRP 108 (2008)	Table C.20	grass value
Np-239	(uGy/hr)/(Bq/m2)	-1			
OBT	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Pa-231	(uGy/hr)/(Bq/m2)	-1			
Pa-233	(uGy/hr)/(Bq/m2)	-1			
Pb-210	(uGy/hr)/(Bq/m2)	-1			
Po-210	(uGy/hr)/(Bq/m2)	-1			
Pu-238	(uGy/hr)/(Bq/m2)	3.58E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-239	(uGy/hr)/(Bq/m2)	1.33E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-240	(uGy/hr)/(Bq/m2)	3.42E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-241	(uGy/hr)/(Bq/m2)	2.13E-10	ICRP 108 (2008)	Table C.20	grass value
Ra-223	(uGy/hr)/(Bq/m2)	-1			
Ra-224	(uGy/hr)/(Bq/m2)	-1			
Ra-225	(uGy/hr)/(Bq/m2)	-1			
Ra-226	(uGy/hr)/(Bq/m2)	1.33E-05	ICRP 108 (2008)	Table C.20	grass value
Ra-228	(uGy/hr)/(Bq/m2)	-1			
Sr-90	(uGy/hr)/(Bq/m2)	3.29E-10	ICRP 108 (2008)	Table C.20	grass value
Tc-99	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Th-227	(uGy/hr)/(Bq/m2)	-1			
Th-228	(uGy/hr)/(Bq/m2)	1.17E-05	ICRP 108 (2008)	Table C.20	grass value
Th-229	(uGy/hr)/(Bq/m2)	3.54E-06	ICRP 108 (2008)	Table C.20	grass value
Th-230	(uGy/hr)/(Bq/m2)	-1			
Th-231	(uGy/hr)/(Bq/m2)	-1			
Th-232	(uGy/hr)/(Bq/m2)	3.00E-07	ICRP 108 (2008)	Table C.20	grass value
Th-234	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.20	grass value
U-233	(uGy/hr)/(Bq/m2)	2.29E-07	ICRP 108 (2008)	Table C.20	grass value
U-234	(uGy/hr)/(Bq/m2)	3.67E-07	ICRP 108 (2008)	Table C.20	grass value
U-235	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.20	grass value
U-236	(uGy/hr)/(Bq/m2)	-1			
U-238	(uGy/hr)/(Bq/m2)	3.04E-07	ICRP 108 (2008)	Table C.20	grass value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil))	1.09E-04	ERICA 1.2.1	Database	Annelid
Ac-227	(uGy/hr)/(Bq/kg(dw soil))	1.76E-04	ERICA 1.2.1	Database	Annelid
Ag-108m	(uGy/hr)/(Bq/kg(dw soil))	8.60E-04	ERICA 1.2.1	Database	Annelid
Am-241	(uGy/hr)/(Bq/kg(dw soil))	6.25E-06	ICRP 108 (2008)	Table C.18	earthworm value
Am-243	(uGy/hr)/(Bq/kg(dw soil))	7.77E-05	ERICA 1.2.1	Database	Annelid
Bi-210	(uGy/hr)/(Bq/kg(dw soil))	4.50E-09	ERICA 1.2.1	Database	Annelid
C-14	(uGy/hr)/(Bq/kg(dw soil))	0.00E+00	ICRP 108 (2008)	Table C.18	earthworm value
Ca-41	(uGy/hr)/(Bq/kg(dw soil))	8.50E-09	ERICA 1.2.1	Database	Annelid
Cl-36	(uGy/hr)/(Bq/kg(dw soil))	7.92E-08	ICRP 108 (2008)	Table C.18	earthworm value
Cm-244	(uGy/hr)/(Bq/kg(dw soil))	1.60E-07	ERICA 1.2.1	Database	Annelid
Co-60	(uGy/hr)/(Bq/kg(dw soil))	0.001292	ICRP 108 (2008)	Table C.18	earthworm value
Cs-137	(uGy/hr)/(Bq/kg(dw soil))	3.04E-04	ICRP 108 (2008)	Table C.18	earthworm value
Eu-152	(uGy/hr)/(Bq/kg(dw soil))	5.83E-04	ICRP 108 (2008)	Table C.18	earthworm value
Eu-154	(uGy/hr)/(Bq/kg(dw soil))	6.25E-04	ICRP 108 (2008)	Table C.18	earthworm value
Eu-155	(uGy/hr)/(Bq/kg(dw soil))	1.58E-05	ICRP 108 (2008)	Table C.18	earthworm value
Fe-55	(uGy/hr)/(Bq/kg(dw soil))	6.12E-08	ERICA 1.2.1	Database	Annelid
Gd-152	(uGy/hr)/(Bq/kg(dw soil))	0.00E+00	ERICA 1.2.1	Database	Annelid
HTO	(uGy/hr)/(Bq/kg(dw soil))	0	ICRP 108 (2008)	Table C.18	earthworm value
I-129	(uGy/hr)/(Bq/kg(dw soil))	3.50E-06	ICRP 108 (2008)	Table C.18	earthworm value
Nb-94	(uGy/hr)/(Bq/kg(dw soil))	8.33E-04	ICRP 108 (2008)	Table C.18	earthworm value
Ni-59	(uGy/hr)/(Bq/kg(dw soil))	1.00E-07	ERICA 1.2.1	Database	Annelid
Ni-63	(uGy/hr)/(Bq/kg(dw soil))	0	ICRP 108 (2008)	Table C.18	earthworm value
Np-237	(uGy/hr)/(Bq/kg(dw soil))	7.50E-06	ICRP 108 (2008)	Table C.18	earthworm value
Np-239	(uGy/hr)/(Bq/kg(dw soil))	6.40E-05	ERICA 1.2.1	Database	Annelid
OBT	(uGy/hr)/(Bq/kg(dw soil))	0.00E+00	Not Applicable		not in medium
Pa-231	(uGy/hr)/(Bq/kg(dw soil))	1.94E-04	ERICA 1.2.1	Database	Annelid
Pa-233	(uGy/hr)/(Bq/kg(dw soil))	8.92E-05	ERICA 1.2.1	Database	Annelid
Pb-210	(uGy/hr)/(Bq/kg(dw soil))	6.00E-07	ERICA 1.2.1	Database	Annelid
Po-210	(uGy/hr)/(Bq/kg(dw soil))	4.50E-09	ERICA 1.2.1	Database	Annelid
Pu-238	(uGy/hr)/(Bq/kg(dw soil))	1.71E-07	ICRP 108 (2008)	Table C.18	earthworm value
Pu-239	(uGy/hr)/(Bq/kg(dw soil))	8.33E-08	ICRP 108 (2008)	Table C.18	earthworm value
Pu-240	(uGy/hr)/(Bq/kg(dw soil))	1.63E-07	ICRP 108 (2008)	Table C.18	earthworm value
Pu-241	(uGy/hr)/(Bq/kg(dw soil))	5.42E-10	ICRP 108 (2008)	Table C.18	earthworm value
Ra-223	(uGy/hr)/(Bq/kg(dw soil))	1.30E-04	ERICA 1.2.1	Database	Annelid
Ra-224	(uGy/hr)/(Bq/kg(dw soil))	9.00E-04	ERICA 1.2.1	Database	Annelid
Ra-225	(uGy/hr)/(Bq/kg(dw soil))	4.13E-04	ERICA 1.2.1	Database	Annelid
Ra-226	(uGy/hr)/(Bq/kg(dw soil))	9.17E-04	ICRP 108 (2008)	Table C.18	earthworm value
Ra-228	(uGy/hr)/(Bq/kg(dw soil))	1.29E-03	ERICA 1.2.1	Database	Annelid
Sr-90	(uGy/hr)/(Bq/kg(dw soil))	1.54E-10	ICRP 108 (2008)	Table C.18	earthworm value
Tc-99	(uGy/hr)/(Bq/kg(dw soil))	0.00E+00	ICRP 108 (2008)	Table C.18	earthworm value
Th-227	(uGy/hr)/(Bq/kg(dw soil))	1.76E-04	ERICA 1.2.1	Database	Annelid
Th-228	(uGy/hr)/(Bq/kg(dw soil))	7.92E-04	ICRP 108 (2008)	Table C.18	earthworm value
Th-229	(uGy/hr)/(Bq/kg(dw soil))	2.79E-05	ICRP 108 (2008)	Table C.18	earthworm value
Th-230	(uGy/hr)/(Bq/kg(dw soil))	2.10E-07	ERICA 1.2.1	Database	Annelid
Th-231	(uGy/hr)/(Bq/kg(dw soil))	1.98E-04	ERICA 1.2.1	Database	Annelid
Th-232	(uGy/hr)/(Bq/kg(dw soil))	1.46E-07	ICRP 108 (2008)	Table C.18	earthworm value
Th-234	(uGy/hr)/(Bq/kg(dw soil))	1.13E-05	ICRP 108 (2008)	Table C.18	earthworm value
U-233	(uGy/hr)/(Bq/kg(dw soil))	2.08E-07	ICRP 108 (2008)	Table C.18	earthworm value
U-234	(uGy/hr)/(Bq/kg(dw soil))	1.75E-07	ICRP 108 (2008)	Table C.18	earthworm value
U-235	(uGy/hr)/(Bq/kg(dw soil))	6.67E-05	ICRP 108 (2008)	Table C.18	earthworm value
U-236	(uGy/hr)/(Bq/kg(dw soil))	1.49E-07	ERICA 1.2.1	Database	Annelid
U-238	(uGy/hr)/(Bq/kg(dw soil))	1.25E-07	ICRP 108 (2008)	Table C.18	earthworm value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15906	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	5.46E-05	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.06E-02	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	2.02E-04	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.58E-06	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.50E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.033	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	1.42E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	1.67E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	3.75E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	3.29E-06	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.18	earthworm; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	3.79E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	1.08E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	3.80E-06	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	1.52E-04	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.18	earthworm;low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	1.15E-04	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.25E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.53E-01	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.60E-01	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.39E-01	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.38E-01	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	2.67E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	5.42E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.37E-02	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.88E-01	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.028233	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	9.58E-05	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02292	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	4.08E-04	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.02544	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025992	ERICA 1.2.1	Database	Annelid; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.18	earthworm; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	0.01	CSA N288.1-14	Table G.3	
Am-243	[]	0.01	CSA N288.1-14	Table G.3	
Bi-210	[]	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	0.01	CSA N288.1-14	Table G.3	
Co-60	[]	0.1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	0.1	CSA N288.1-14	Table G.3	
Eu-154	[]	0.1	CSA N288.1-14	Table G.3	
Eu-155	[]	0.1	CSA N288.1-14	Table G.3	
Fe-55	[]	0.1	CSA N288.1-14	Table G.3	
Gd-152	[]	0.1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	0.1	CSA N288.1-14	Table G.3	
Nb-94	[]	0.1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	0.1	CSA N288.1-14	Table G.3	
Np-239	[]	0.1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	0.1	CSA N288.1-14	Table G.3	
Pa-233	[]	0.1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	0.01	CSA N288.1-14	Table G.3	
Pu-239	[]	0.01	CSA N288.1-14	Table G.3	
Pu-240	[]	0.01	CSA N288.1-14	Table G.3	
Pu-241	[]	0.01	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	0.01	CSA N288.1-14	Table G.3	
Th-228	[]	0.01	CSA N288.1-14	Table G.3	
Th-229	[]	0.01	CSA N288.1-14	Table G.3	
Th-230	[]	0.01	CSA N288.1-14	Table G.3	
Th-231	[]	0.01	CSA N288.1-14	Table G.3	
Th-232	[]	0.01	CSA N288.1-14	Table G.3	
Th-234	[]	0.01	CSA N288.1-14	Table G.3	
U-233	[]	0.1	CSA N288.1-14	Table G.3	
U-234	[]	0.1	CSA N288.1-14	Table G.3	
U-235	[]	0.1	CSA N288.1-14	Table G.3	
U-236	[]	0.1	CSA N288.1-14	Table G.3	
U-238	[]	0.1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	4.118	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5876	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5876	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.035	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	2529	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05276	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	1.047	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.8059	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.03576	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5259	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.004665	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.004665	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.004665	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	882.4	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.9176	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.002971	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.3835	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.3835	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5876	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5876	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	882.4	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.2253	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.1706	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.1706	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.1706	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.1706	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5294	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5294	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5294	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5294	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.5294	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05276	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	2.176	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.052	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	0.48			
Removal Half Life	days	28			
Effective Deposition Duration	days	30			
Foliar Interception Fraction	[]	1			
Water Retained PerLeaf Area	L/m2	0.1			
Harvest Index	[]	1			
Holdup Time	s	86400			
Irrigation Frequency	1/s	0.00000334			
Leaf Area Index	[]	3			
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.17			For soil invertebrates
Isotopic Discrimination Factor	[]	0.7			
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.7	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	1	CSA N288.1-14	cl. 6.4.9.3	f(c_air); default value for atmospheric release
Plant To Shoot Yield Ratio	[]	2			
Stable Carbon Concentration	g-C/kg(dw)	652.9	CSA N288.1-14		aquatic invert converted to dry weight based on soil invert dry fresh weight ratio
Fraction of plant immersed in soil	[]	1			
Fraction of plant above the soil surface	[]	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.12E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.32E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.32E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	2.25E-06	ICRP 108 (2008)	Table C.20	grass value
Am-243	(uGy/hr)/(Bq/m2)	2.64E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Ca-41	(uGy/hr)/(Bq/m2)	7.65E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.20	grass value
Cm-244	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	1.79E-05	ICRP 108 (2008)	Table C.20	grass value
Cs-137	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-152	(uGy/hr)/(Bq/m2)	9.17E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-154	(uGy/hr)/(Bq/m2)	9.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-155	(uGy/hr)/(Bq/m2)	7.08E-07	ICRP 108 (2008)	Table C.20	grass value
Fe-55	(uGy/hr)/(Bq/m2)	5.50E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
I-129	(uGy/hr)/(Bq/m2)	9.17E-07	ICRP 108 (2008)	Table C.20	grass value
Nb-94	(uGy/hr)/(Bq/m2)	1.21E-05	ICRP 108 (2008)	Table C.20	grass value
Ni-59	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Np-237	(uGy/hr)/(Bq/m2)	2.29E-06	ICRP 108 (2008)	Table C.20	grass value
Np-239	(uGy/hr)/(Bq/m2)	2.14E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Pa-231	(uGy/hr)/(Bq/m2)	5.89E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.75E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.86E-09	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	3.58E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-239	(uGy/hr)/(Bq/m2)	1.33E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-240	(uGy/hr)/(Bq/m2)	3.42E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-241	(uGy/hr)/(Bq/m2)	2.13E-10	ICRP 108 (2008)	Table C.20	grass value
Ra-223	(uGy/hr)/(Bq/m2)	3.89E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.31E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.18E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	1.33E-05	ICRP 108 (2008)	Table C.20	grass value
Ra-228	(uGy/hr)/(Bq/m2)	3.36E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.29E-10	ICRP 108 (2008)	Table C.20	grass value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Th-227	(uGy/hr)/(Bq/m2)	5.32E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	1.17E-05	ICRP 108 (2008)	Table C.20	grass value
Th-229	(uGy/hr)/(Bq/m2)	3.54E-06	ICRP 108 (2008)	Table C.20	grass value
Th-230	(uGy/hr)/(Bq/m2)	1.00E-09	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	6.08E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	3.00E-07	ICRP 108 (2008)	Table C.20	grass value
Th-234	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.20	grass value
U-233	(uGy/hr)/(Bq/m2)	2.29E-07	ICRP 108 (2008)	Table C.20	grass value
U-234	(uGy/hr)/(Bq/m2)	3.67E-07	ICRP 108 (2008)	Table C.20	grass value
U-235	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.20	grass value
U-236	(uGy/hr)/(Bq/m2)	8.60E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.04E-07	ICRP 108 (2008)	Table C.20	grass value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15906	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	5.23E-05	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.06E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	2.01E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.57E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.50E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.033	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	1.42E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	1.67E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	3.71E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	3.27E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.20	grass; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	3.79E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	1.08E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	3.80E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	1.51E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-10	ICRP 108 (2008)	Table C.20	grass; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	1.15E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.25E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.53E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.60E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.39E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.38E-01	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	2.63E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	5.00E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.37E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.84E-01	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.028233	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	9.58E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02292	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	4.00E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.02547	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025992	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	1	CSA N288.1-14	Table G.3	
Am-243	[]	1	CSA N288.1-14	Table G.3	
Bi-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	1	CSA N288.1-14	Table G.3	
Co-60	[]	1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	1	CSA N288.1-14	Table G.3	
Eu-154	[]	1	CSA N288.1-14	Table G.3	
Eu-155	[]	1	CSA N288.1-14	Table G.3	
Fe-55	[]	1	CSA N288.1-14	Table G.3	
Gd-152	[]	1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	1	CSA N288.1-14	Table G.3	
Nb-94	[]	1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	1	CSA N288.1-14	Table G.3	
Np-239	[]	1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	1	CSA N288.1-14	Table G.3	
Pa-233	[]	1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	1	CSA N288.1-14	Table G.3	
Pu-239	[]	1	CSA N288.1-14	Table G.3	
Pu-240	[]	1	CSA N288.1-14	Table G.3	
Pu-241	[]	1	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	1	CSA N288.1-14	Table G.3	
Th-228	[]	1	CSA N288.1-14	Table G.3	
Th-229	[]	1	CSA N288.1-14	Table G.3	
Th-230	[]	1	CSA N288.1-14	Table G.3	
Th-231	[]	1	CSA N288.1-14	Table G.3	
Th-232	[]	1	CSA N288.1-14	Table G.3	
Th-234	[]	1	CSA N288.1-14	Table G.3	
U-233	[]	1	CSA N288.1-14	Table G.3	
U-234	[]	1	CSA N288.1-14	Table G.3	
U-235	[]	1	CSA N288.1-14	Table G.3	
U-236	[]	1	CSA N288.1-14	Table G.3	
U-238	[]	1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	0.48	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc; value for forage
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	30	CSA N288.1-14	cl. 6.4.5	te; value for pasture grass
Foliar Interception Fraction	[]	1	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for forage and wild plants
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	hi; value for forage
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for forage
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.2	CSA N288.1-14	Table G.5	DWp; value for forage
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	2.49E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	4.25E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	1.85E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	9.17E-08	ICRP 108 (2008)	Table C.19	pine tree value
Am-243	(uGy/hr)/(Bq/m2)	2.06E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.00E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	pine tree value
Ca-41	(uGy/hr)/(Bq/m2)	1.61E-15	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	3.54E-10	ICRP 108 (2008)	Table C.19	pine tree value
Cm-244	(uGy/hr)/(Bq/m2)	7.86E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	5.42E-06	ICRP 108 (2008)	Table C.19	pine tree value
Cs-137	(uGy/hr)/(Bq/m2)	1.29E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-152	(uGy/hr)/(Bq/m2)	2.67E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-154	(uGy/hr)/(Bq/m2)	2.83E-06	ICRP 108 (2008)	Table C.19	pine tree value
Eu-155	(uGy/hr)/(Bq/m2)	1.63E-07	ICRP 108 (2008)	Table C.19	pine tree value
Fe-55	(uGy/hr)/(Bq/m2)	1.16E-14	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.19	pine tree value
I-129	(uGy/hr)/(Bq/m2)	1.17E-07	ICRP 108 (2008)	Table C.19	pine tree value
Nb-94	(uGy/hr)/(Bq/m2)	3.63E-06	ICRP 108 (2008)	Table C.19	pine tree value
Ni-59	(uGy/hr)/(Bq/m2)	1.93E-14	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.19	pine tree value
Np-237	(uGy/hr)/(Bq/m2)	9.17E-08	ICRP 108 (2008)	Table C.19	pine tree value
Np-239	(uGy/hr)/(Bq/m2)	1.68E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	not in soil
Pa-231	(uGy/hr)/(Bq/m2)	4.65E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.17E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.00E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	4.17E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-239	(uGy/hr)/(Bq/m2)	1.75E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-240	(uGy/hr)/(Bq/m2)	4.08E-09	ICRP 108 (2008)	Table C.19	pine tree value
Pu-241	(uGy/hr)/(Bq/m2)	6.25E-12	ICRP 108 (2008)	Table C.19	pine tree value
Ra-223	(uGy/hr)/(Bq/m2)	3.10E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	1.88E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	9.41E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	3.88E-06	ICRP 108 (2008)	Table C.19	pine tree value
Ra-228	(uGy/hr)/(Bq/m2)	2.71E-06	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.75E-12	ICRP 108 (2008)	Table C.19	pine tree value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.19	pine tree value
Th-227	(uGy/hr)/(Bq/m2)	4.24E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	3.25E-06	ICRP 108 (2008)	Table C.19	pine tree value
Th-229	(uGy/hr)/(Bq/m2)	2.25E-07	ICRP 108 (2008)	Table C.19	pine tree value
Th-230	(uGy/hr)/(Bq/m2)	3.14E-10	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	4.75E-07	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	2.13E-09	ICRP 108 (2008)	Table C.19	pine tree value
Th-234	(uGy/hr)/(Bq/m2)	6.67E-08	ICRP 108 (2008)	Table C.19	pine tree value
U-233	(uGy/hr)/(Bq/m2)	2.75E-09	ICRP 108 (2008)	Table C.19	pine tree value
U-234	(uGy/hr)/(Bq/m2)	3.38E-09	ICRP 108 (2008)	Table C.19	pine tree value
U-235	(uGy/hr)/(Bq/m2)	4.58E-07	ICRP 108 (2008)	Table C.19	pine tree value
U-236	(uGy/hr)/(Bq/m2)	7.88E-11	ERICA 1.2.1	Database	Tree; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	2.63E-09	ICRP 108 (2008)	Table C.19	pine tree value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	-1			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15917	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	5.74E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.07E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	2.24E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.59E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.58E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.033	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	7.50E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	3.25E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	4.13E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	5.42E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	6.25E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	3.40E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.19	pine tree; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	5.00E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	5.83E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	4.00E-06	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	2.20E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.19	pine tree; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	1.91E-04	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.50E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.53E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.61E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.39E-01	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.41E-01	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	5.83E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	6.67E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.44E-02	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.87E-01	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.02812	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	1.08E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02333	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	5.00E-04	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.025768	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025993	ERICA 1.2.1	Database	Tree; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.19	pine tree; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	0.01	CSA N288.1-14	Table G.3	
Am-243	[]	0.01	CSA N288.1-14	Table G.3	
Bi-210	[]	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	0.01	CSA N288.1-14	Table G.3	
Co-60	[]	0.1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	0.1	CSA N288.1-14	Table G.3	
Eu-154	[]	0.1	CSA N288.1-14	Table G.3	
Eu-155	[]	0.1	CSA N288.1-14	Table G.3	
Fe-55	[]	0.1	CSA N288.1-14	Table G.3	
Gd-152	[]	0.1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	0.1	CSA N288.1-14	Table G.3	
Nb-94	[]	0.1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	0.1	CSA N288.1-14	Table G.3	
Np-239	[]	0.1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	0.1	CSA N288.1-14	Table G.3	
Pa-233	[]	0.1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	0.01	CSA N288.1-14	Table G.3	
Pu-239	[]	0.01	CSA N288.1-14	Table G.3	
Pu-240	[]	0.01	CSA N288.1-14	Table G.3	
Pu-241	[]	0.01	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	0.01	CSA N288.1-14	Table G.3	
Th-228	[]	0.01	CSA N288.1-14	Table G.3	
Th-229	[]	0.01	CSA N288.1-14	Table G.3	
Th-230	[]	0.01	CSA N288.1-14	Table G.3	
Th-231	[]	0.01	CSA N288.1-14	Table G.3	
Th-232	[]	0.01	CSA N288.1-14	Table G.3	
Th-234	[]	0.01	CSA N288.1-14	Table G.3	
U-233	[]	0.1	CSA N288.1-14	Table G.3	
U-234	[]	0.1	CSA N288.1-14	Table G.3	
U-235	[]	0.1	CSA N288.1-14	Table G.3	
U-236	[]	0.1	CSA N288.1-14	Table G.3	
U-238	[]	0.1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc;
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	60	CSA N288.1-14	cl. 6.4.5	te; value for crops not pasture grass
Foliar Interception Fraction	[]	0.5	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for fruits and vegetables
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	0.8	CSA N288.1-14	cl. 6.3.7.2, Table G.5	th; value for fruits and vegetables
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for fruits and vegetables
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.1	CSA N288.1-14	Table G.5	DWp; value for fruits and vegetables
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	0.01	CSA N288.1-14	Table G.3	
Am-243	[]	0.01	CSA N288.1-14	Table G.3	
Bi-210	[]	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	0.01	CSA N288.1-14	Table G.3	
Co-60	[]	0.1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	0.1	CSA N288.1-14	Table G.3	
Eu-154	[]	0.1	CSA N288.1-14	Table G.3	
Eu-155	[]	0.1	CSA N288.1-14	Table G.3	
Fe-55	[]	0.1	CSA N288.1-14	Table G.3	
Gd-152	[]	0.1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	0.1	CSA N288.1-14	Table G.3	
Nb-94	[]	0.1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	0.1	CSA N288.1-14	Table G.3	
Np-239	[]	0.1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	0.1	CSA N288.1-14	Table G.3	
Pa-233	[]	0.1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	0.01	CSA N288.1-14	Table G.3	
Pu-239	[]	0.01	CSA N288.1-14	Table G.3	
Pu-240	[]	0.01	CSA N288.1-14	Table G.3	
Pu-241	[]	0.01	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	0.01	CSA N288.1-14	Table G.3	
Th-228	[]	0.01	CSA N288.1-14	Table G.3	
Th-229	[]	0.01	CSA N288.1-14	Table G.3	
Th-230	[]	0.01	CSA N288.1-14	Table G.3	
Th-231	[]	0.01	CSA N288.1-14	Table G.3	
Th-232	[]	0.01	CSA N288.1-14	Table G.3	
Th-234	[]	0.01	CSA N288.1-14	Table G.3	
U-233	[]	0.1	CSA N288.1-14	Table G.3	
U-234	[]	0.1	CSA N288.1-14	Table G.3	
U-235	[]	0.1	CSA N288.1-14	Table G.3	
U-236	[]	0.1	CSA N288.1-14	Table G.3	
U-238	[]	0.1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc; value for fruits and vegetables
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	60	CSA N288.1-14	cl. 6.4.5	te; value for crops not pasture grass
Foliar Interception Fraction	[]	0.5	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for fruits and vegetables
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	0.8	CSA N288.1-14	cl. 6.3.7.2, Table G.5	hi; value for fruits and vegetables
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for fruits and vegetables
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.1	CSA N288.1-14	Table G.5	DWp; value for fruits and vegetables
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m2)	3.12E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ac-227	(uGy/hr)/(Bq/m2)	5.32E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ag-108m	(uGy/hr)/(Bq/m2)	2.32E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Am-241	(uGy/hr)/(Bq/m2)	2.25E-06	ICRP 108 (2008)	Table C.20	grass value
Am-243	(uGy/hr)/(Bq/m2)	2.64E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Bi-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
C-14	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Ca-41	(uGy/hr)/(Bq/m2)	7.65E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Cl-36	(uGy/hr)/(Bq/m2)	5.00E-10	ICRP 108 (2008)	Table C.20	grass value
Cm-244	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Co-60	(uGy/hr)/(Bq/m2)	1.79E-05	ICRP 108 (2008)	Table C.20	grass value
Cs-137	(uGy/hr)/(Bq/m2)	4.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-152	(uGy/hr)/(Bq/m2)	9.17E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-154	(uGy/hr)/(Bq/m2)	9.58E-06	ICRP 108 (2008)	Table C.20	grass value
Eu-155	(uGy/hr)/(Bq/m2)	7.08E-07	ICRP 108 (2008)	Table C.20	grass value
Fe-55	(uGy/hr)/(Bq/m2)	5.50E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Gd-152	(uGy/hr)/(Bq/m2)	0.00E+00	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
HTO	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
I-129	(uGy/hr)/(Bq/m2)	9.17E-07	ICRP 108 (2008)	Table C.20	grass value
Nb-94	(uGy/hr)/(Bq/m2)	1.21E-05	ICRP 108 (2008)	Table C.20	grass value
Ni-59	(uGy/hr)/(Bq/m2)	9.29E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ni-63	(uGy/hr)/(Bq/m2)	0	ICRP 108 (2008)	Table C.20	grass value
Np-237	(uGy/hr)/(Bq/m2)	2.29E-06	ICRP 108 (2008)	Table C.20	grass value
Np-239	(uGy/hr)/(Bq/m2)	2.14E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
OBT	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Pa-231	(uGy/hr)/(Bq/m2)	5.89E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pa-233	(uGy/hr)/(Bq/m2)	2.75E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pb-210	(uGy/hr)/(Bq/m2)	2.86E-09	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Po-210	(uGy/hr)/(Bq/m2)	1.21E-11	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Pu-238	(uGy/hr)/(Bq/m2)	3.58E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-239	(uGy/hr)/(Bq/m2)	1.33E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-240	(uGy/hr)/(Bq/m2)	3.42E-07	ICRP 108 (2008)	Table C.20	grass value
Pu-241	(uGy/hr)/(Bq/m2)	2.13E-10	ICRP 108 (2008)	Table C.20	grass value
Ra-223	(uGy/hr)/(Bq/m2)	3.89E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-224	(uGy/hr)/(Bq/m2)	2.31E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-225	(uGy/hr)/(Bq/m2)	1.18E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Ra-226	(uGy/hr)/(Bq/m2)	1.33E-05	ICRP 108 (2008)	Table C.20	grass value
Ra-228	(uGy/hr)/(Bq/m2)	3.36E-06	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Sr-90	(uGy/hr)/(Bq/m2)	3.29E-10	ICRP 108 (2008)	Table C.20	grass value
Tc-99	(uGy/hr)/(Bq/m2)	0.00E+00	ICRP 108 (2008)	Table C.20	grass value
Th-227	(uGy/hr)/(Bq/m2)	5.32E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-228	(uGy/hr)/(Bq/m2)	1.17E-05	ICRP 108 (2008)	Table C.20	grass value
Th-229	(uGy/hr)/(Bq/m2)	3.54E-06	ICRP 108 (2008)	Table C.20	grass value
Th-230	(uGy/hr)/(Bq/m2)	1.00E-09	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-231	(uGy/hr)/(Bq/m2)	6.08E-07	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
Th-232	(uGy/hr)/(Bq/m2)	3.00E-07	ICRP 108 (2008)	Table C.20	grass value
Th-234	(uGy/hr)/(Bq/m2)	5.42E-07	ICRP 108 (2008)	Table C.20	grass value
U-233	(uGy/hr)/(Bq/m2)	2.29E-07	ICRP 108 (2008)	Table C.20	grass value
U-234	(uGy/hr)/(Bq/m2)	3.67E-07	ICRP 108 (2008)	Table C.20	grass value
U-235	(uGy/hr)/(Bq/m2)	5.00E-06	ICRP 108 (2008)	Table C.20	grass value
U-236	(uGy/hr)/(Bq/m2)	8.60E-10	ERICA 1.2.1	Database	Grasses & Herbs; Assuming a 10-cm depth uniform volume source
U-238	(uGy/hr)/(Bq/m2)	3.04E-07	ICRP 108 (2008)	Table C.20	grass value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ac-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ag-108m	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Am-243	(uGy/hr)/(Bq/kg(dw soil))	-1			
Bi-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
C-14	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ca-41	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cl-36	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cm-244	(uGy/hr)/(Bq/kg(dw soil))	-1			
Co-60	(uGy/hr)/(Bq/kg(dw soil))	-1			
Cs-137	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-154	(uGy/hr)/(Bq/kg(dw soil))	-1			
Eu-155	(uGy/hr)/(Bq/kg(dw soil))	-1			
Fe-55	(uGy/hr)/(Bq/kg(dw soil))	-1			
Gd-152	(uGy/hr)/(Bq/kg(dw soil))	-1			
HTO	(uGy/hr)/(Bq/kg(dw soil))	-1			
I-129	(uGy/hr)/(Bq/kg(dw soil))	-1			
Nb-94	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-59	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ni-63	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-237	(uGy/hr)/(Bq/kg(dw soil))	-1			
Np-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
OBT	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pa-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pb-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Po-210	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-238	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-239	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-240	(uGy/hr)/(Bq/kg(dw soil))	-1			
Pu-241	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-223	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-224	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-225	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-226	(uGy/hr)/(Bq/kg(dw soil))	-1			
Ra-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Sr-90	(uGy/hr)/(Bq/kg(dw soil))	-1			
Tc-99	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-227	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-228	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-229	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-230	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-231	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-232	(uGy/hr)/(Bq/kg(dw soil))	-1			
Th-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-233	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-234	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-235	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-236	(uGy/hr)/(Bq/kg(dw soil))	-1			
U-238	(uGy/hr)/(Bq/kg(dw soil))	-1			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/m3)	-1			
Ac-227	(uGy/hr)/(Bq/m3)	-1			
Ag-108m	(uGy/hr)/(Bq/m3)	0			
Am-241	(uGy/hr)/(Bq/m3)	0			
Am-243	(uGy/hr)/(Bq/m3)	0			
Bi-210	(uGy/hr)/(Bq/m3)	-1			
C-14	(uGy/hr)/(Bq/m3)	0			
Ca-41	(uGy/hr)/(Bq/m3)	-1			
Cl-36	(uGy/hr)/(Bq/m3)	0			
Cm-244	(uGy/hr)/(Bq/m3)	0			
Co-60	(uGy/hr)/(Bq/m3)	0			
Cs-137	(uGy/hr)/(Bq/m3)	0			
Eu-152	(uGy/hr)/(Bq/m3)	0			
Eu-154	(uGy/hr)/(Bq/m3)	0			
Eu-155	(uGy/hr)/(Bq/m3)	0			
Fe-55	(uGy/hr)/(Bq/m3)	0			
Gd-152	(uGy/hr)/(Bq/m3)	-1			
HTO	(uGy/hr)/(Bq/m3)	0			
I-129	(uGy/hr)/(Bq/m3)	0			
Nb-94	(uGy/hr)/(Bq/m3)	0			
Ni-59	(uGy/hr)/(Bq/m3)	-1			
Ni-63	(uGy/hr)/(Bq/m3)	0			
Np-237	(uGy/hr)/(Bq/m3)	0			
Np-239	(uGy/hr)/(Bq/m3)	0			
OBT	(uGy/hr)/(Bq/m3)	0			
Pa-231	(uGy/hr)/(Bq/m3)	-1			
Pa-233	(uGy/hr)/(Bq/m3)	-1			
Pb-210	(uGy/hr)/(Bq/m3)	-1			
Po-210	(uGy/hr)/(Bq/m3)	-1			
Pu-238	(uGy/hr)/(Bq/m3)	0			
Pu-239	(uGy/hr)/(Bq/m3)	0			
Pu-240	(uGy/hr)/(Bq/m3)	0			
Pu-241	(uGy/hr)/(Bq/m3)	0			
Ra-223	(uGy/hr)/(Bq/m3)	-1			
Ra-224	(uGy/hr)/(Bq/m3)	-1			
Ra-225	(uGy/hr)/(Bq/m3)	-1			
Ra-226	(uGy/hr)/(Bq/m3)	0			
Ra-228	(uGy/hr)/(Bq/m3)	-1			
Sr-90	(uGy/hr)/(Bq/m3)	0			
Tc-99	(uGy/hr)/(Bq/m3)	0			
Th-227	(uGy/hr)/(Bq/m3)	-1			
Th-228	(uGy/hr)/(Bq/m3)	0			
Th-229	(uGy/hr)/(Bq/m3)	0			
Th-230	(uGy/hr)/(Bq/m3)	-1			
Th-231	(uGy/hr)/(Bq/m3)	-1			
Th-232	(uGy/hr)/(Bq/m3)	0			
Th-234	(uGy/hr)/(Bq/m3)	0			
U-233	(uGy/hr)/(Bq/m3)	0			
U-234	(uGy/hr)/(Bq/m3)	0			
U-235	(uGy/hr)/(Bq/m3)	0			
U-236	(uGy/hr)/(Bq/m3)	0			
U-238	(uGy/hr)/(Bq/m3)	0			

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(uGy/hr)/(Bq/kg(fw plant))	0.15906	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ac-227	(uGy/hr)/(Bq/kg(fw plant))	4.02E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ag-108m	(uGy/hr)/(Bq/kg(fw plant))	5.23E-05	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Am-241	(uGy/hr)/(Bq/kg(fw plant))	0.03179	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Am-243	(uGy/hr)/(Bq/kg(fw plant))	3.06E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Bi-210	(uGy/hr)/(Bq/kg(fw plant))	2.01E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
C-14	(uGy/hr)/(Bq/kg(fw plant))	2.83E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ca-41	(uGy/hr)/(Bq/kg(fw plant))	1.57E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Cl-36	(uGy/hr)/(Bq/kg(fw plant))	1.50E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Cm-244	(uGy/hr)/(Bq/kg(fw plant))	0.033	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Co-60	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Cs-137	(uGy/hr)/(Bq/kg(fw plant))	1.42E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-152	(uGy/hr)/(Bq/kg(fw plant))	7.50E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-154	(uGy/hr)/(Bq/kg(fw plant))	1.67E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Eu-155	(uGy/hr)/(Bq/kg(fw plant))	3.71E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Fe-55	(uGy/hr)/(Bq/kg(fw plant))	3.27E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Gd-152	(uGy/hr)/(Bq/kg(fw plant))	1.24E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
HTO	(uGy/hr)/(Bq/kg(fw plant))	5.76E-06	ICRP 108 (2008)	Table C.20	grass; low beta component increased by 2x
I-129	(uGy/hr)/(Bq/kg(fw plant))	3.79E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Nb-94	(uGy/hr)/(Bq/kg(fw plant))	1.08E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ni-59	(uGy/hr)/(Bq/kg(fw plant))	3.80E-06	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ni-63	(uGy/hr)/(Bq/kg(fw plant))	1.00E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Np-237	(uGy/hr)/(Bq/kg(fw plant))	2.74E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Np-239	(uGy/hr)/(Bq/kg(fw plant))	1.51E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
OBT	(uGy/hr)/(Bq/kg(fw plant))	5.76E-10	ICRP 108 (2008)	Table C.20	grass; low beta component increased by 2x
Pa-231	(uGy/hr)/(Bq/kg(fw plant))	2.87E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Pa-233	(uGy/hr)/(Bq/kg(fw plant))	1.15E-04	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Pb-210	(uGy/hr)/(Bq/kg(fw plant))	2.25E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Po-210	(uGy/hr)/(Bq/kg(fw plant))	0.030417	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-238	(uGy/hr)/(Bq/kg(fw plant))	3.17E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-239	(uGy/hr)/(Bq/kg(fw plant))	2.96E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-240	(uGy/hr)/(Bq/kg(fw plant))	3.00E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Pu-241	(uGy/hr)/(Bq/kg(fw plant))	3.64E-06	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ra-223	(uGy/hr)/(Bq/kg(fw plant))	1.53E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-224	(uGy/hr)/(Bq/kg(fw plant))	1.60E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-225	(uGy/hr)/(Bq/kg(fw plant))	4.39E-01	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Ra-226	(uGy/hr)/(Bq/kg(fw plant))	1.38E-01	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Ra-228	(uGy/hr)/(Bq/kg(fw plant))	2.63E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Sr-90	(uGy/hr)/(Bq/kg(fw plant))	5.00E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Tc-99	(uGy/hr)/(Bq/kg(fw plant))	5.83E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-227	(uGy/hr)/(Bq/kg(fw plant))	3.37E-02	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
Th-228	(uGy/hr)/(Bq/kg(fw plant))	1.84E-01	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-229	(uGy/hr)/(Bq/kg(fw plant))	0.028233	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-230	(uGy/hr)/(Bq/kg(fw plant))	0.02708	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-231	(uGy/hr)/(Bq/kg(fw plant))	9.58E-05	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-232	(uGy/hr)/(Bq/kg(fw plant))	0.02292	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
Th-234	(uGy/hr)/(Bq/kg(fw plant))	4.00E-04	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-233	(uGy/hr)/(Bq/kg(fw plant))	2.79E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-234	(uGy/hr)/(Bq/kg(fw plant))	2.75E-02	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-235	(uGy/hr)/(Bq/kg(fw plant))	0.02547	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x
U-236	(uGy/hr)/(Bq/kg(fw plant))	0.025992	ERICA 1.2.1	Database	Grasses & Herbs; alpha component increased by 10x
U-238	(uGy/hr)/(Bq/kg(fw plant))	0.02417	ICRP 108 (2008)	Table C.20	grass; alpha component increased by 10x

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	1	CSA N288.1-14	Table G.3	
Am-243	[]	1	CSA N288.1-14	Table G.3	
Bi-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	1	CSA N288.1-14	Table G.3	
Co-60	[]	1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	1	CSA N288.1-14	Table G.3	
Eu-154	[]	1	CSA N288.1-14	Table G.3	
Eu-155	[]	1	CSA N288.1-14	Table G.3	
Fe-55	[]	1	CSA N288.1-14	Table G.3	
Gd-152	[]	1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	1	CSA N288.1-14	Table G.3	
Nb-94	[]	1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	1	CSA N288.1-14	Table G.3	
Np-239	[]	1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	1	CSA N288.1-14	Table G.3	
Pa-233	[]	1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	1	CSA N288.1-14	Table G.3	
Pu-239	[]	1	CSA N288.1-14	Table G.3	
Pu-240	[]	1	CSA N288.1-14	Table G.3	
Pu-241	[]	1	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	1	CSA N288.1-14	Table G.3	
Th-228	[]	1	CSA N288.1-14	Table G.3	
Th-229	[]	1	CSA N288.1-14	Table G.3	
Th-230	[]	1	CSA N288.1-14	Table G.3	
Th-231	[]	1	CSA N288.1-14	Table G.3	
Th-232	[]	1	CSA N288.1-14	Table G.3	
Th-234	[]	1	CSA N288.1-14	Table G.3	
U-233	[]	1	CSA N288.1-14	Table G.3	
U-234	[]	1	CSA N288.1-14	Table G.3	
U-235	[]	1	CSA N288.1-14	Table G.3	
U-236	[]	1	CSA N288.1-14	Table G.3	
U-238	[]	1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	0.48	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc; value for forage
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	30	CSA N288.1-14	cl. 6.4.5	te; value for pasture grass
Foliar Interception Fraction	[]	1	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for forage and wild plants
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	hi; value for forage
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for forage
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.2	CSA N288.1-14	Table G.5	DWp; value for forage
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0			OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	1			OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	0.01	CSA N288.1-14	Table G.3	
Am-243	[]	0.01	CSA N288.1-14	Table G.3	
Bi-210	[]	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	0.01	CSA N288.1-14	Table G.3	
Co-60	[]	0.1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	0.1	CSA N288.1-14	Table G.3	
Eu-154	[]	0.1	CSA N288.1-14	Table G.3	
Eu-155	[]	0.1	CSA N288.1-14	Table G.3	
Fe-55	[]	0.1	CSA N288.1-14	Table G.3	
Gd-152	[]	0.1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	0.1	CSA N288.1-14	Table G.3	
Nb-94	[]	0.1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	0.1	CSA N288.1-14	Table G.3	
Np-239	[]	0.1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	0.1	CSA N288.1-14	Table G.3	
Pa-233	[]	0.1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	0.01	CSA N288.1-14	Table G.3	
Pu-239	[]	0.01	CSA N288.1-14	Table G.3	
Pu-240	[]	0.01	CSA N288.1-14	Table G.3	
Pu-241	[]	0.01	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	0.01	CSA N288.1-14	Table G.3	
Th-228	[]	0.01	CSA N288.1-14	Table G.3	
Th-229	[]	0.01	CSA N288.1-14	Table G.3	
Th-230	[]	0.01	CSA N288.1-14	Table G.3	
Th-231	[]	0.01	CSA N288.1-14	Table G.3	
Th-232	[]	0.01	CSA N288.1-14	Table G.3	
Th-234	[]	0.01	CSA N288.1-14	Table G.3	
U-233	[]	0.1	CSA N288.1-14	Table G.3	
U-234	[]	0.1	CSA N288.1-14	Table G.3	
U-235	[]	0.1	CSA N288.1-14	Table G.3	
U-236	[]	0.1	CSA N288.1-14	Table G.3	
U-238	[]	0.1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	2.1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc; value for potatoes
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	60	CSA N288.1-14	cl. 6.4.5	te; value for crops not pasture grass
Foliar Interception Fraction	[]	0.5	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for potatoes
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	0.8	CSA N288.1-14	cl. 6.3.7.2, Table G.5	hi; value for potatoes
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for potatoes
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.21	CSA N288.1-14	Table G.5	DWp; value for potatoes
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	[]	0.1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	[]	1	CSA N288.1-14	Table G.3	
Am-241	[]	0.01	CSA N288.1-14	Table G.3	
Am-243	[]	0.01	CSA N288.1-14	Table G.3	
Bi-210	[]	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	[]	1	CSA N288.1-14	Table G.3	
Ca-41	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	[]	1	CSA N288.1-14	Table G.3	
Cm-244	[]	0.01	CSA N288.1-14	Table G.3	
Co-60	[]	0.1	CSA N288.1-14	Table G.3	
Cs-137	[]	1	CSA N288.1-14	Table G.3	
Eu-152	[]	0.1	CSA N288.1-14	Table G.3	
Eu-154	[]	0.1	CSA N288.1-14	Table G.3	
Eu-155	[]	0.1	CSA N288.1-14	Table G.3	
Fe-55	[]	0.1	CSA N288.1-14	Table G.3	
Gd-152	[]	0.1	CSA N288.1-14	Table G.3	
HTO	[]	1	CSA N288.1-14	Table G.3	
I-129	[]	0.1	CSA N288.1-14	Table G.3	
Nb-94	[]	0.1	CSA N288.1-14	Table G.3	
Ni-59	[]	1	CSA N288.1-14	Table G.3	
Ni-63	[]	1	CSA N288.1-14	Table G.3	
Np-237	[]	0.1	CSA N288.1-14	Table G.3	
Np-239	[]	0.1	CSA N288.1-14	Table G.3	
OBT	[]	1	CSA N288.1-14	Table G.3	
Pa-231	[]	0.1	CSA N288.1-14	Table G.3	
Pa-233	[]	0.1	CSA N288.1-14	Table G.3	
Pb-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	[]	1	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	[]	0.01	CSA N288.1-14	Table G.3	
Pu-239	[]	0.01	CSA N288.1-14	Table G.3	
Pu-240	[]	0.01	CSA N288.1-14	Table G.3	
Pu-241	[]	0.01	CSA N288.1-14	Table G.3	
Ra-223	[]	1	CSA N288.1-14	Table G.3	
Ra-224	[]	1	CSA N288.1-14	Table G.3	
Ra-225	[]	1	CSA N288.1-14	Table G.3	
Ra-226	[]	1	CSA N288.1-14	Table G.3	
Ra-228	[]	1	CSA N288.1-14	Table G.3	
Sr-90	[]	1	CSA N288.1-14	Table G.3	
Tc-99	[]	1	CSA N288.1-14	Table G.3	
Th-227	[]	0.01	CSA N288.1-14	Table G.3	
Th-228	[]	0.01	CSA N288.1-14	Table G.3	
Th-229	[]	0.01	CSA N288.1-14	Table G.3	
Th-230	[]	0.01	CSA N288.1-14	Table G.3	
Th-231	[]	0.01	CSA N288.1-14	Table G.3	
Th-232	[]	0.01	CSA N288.1-14	Table G.3	
Th-234	[]	0.01	CSA N288.1-14	Table G.3	
U-233	[]	0.1	CSA N288.1-14	Table G.3	
U-234	[]	0.1	CSA N288.1-14	Table G.3	
U-235	[]	0.1	CSA N288.1-14	Table G.3	
U-236	[]	0.1	CSA N288.1-14	Table G.3	
U-238	[]	0.1	CSA N288.1-14	Table G.3	

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ac-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ag-108m	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Am-243	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Bi-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
C-14	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ca-41	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cl-36	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cm-244	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Co-60	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Cs-137	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-154	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Eu-155	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Fe-55	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Gd-152	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
HTO	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
I-129	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Nb-94	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-59	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ni-63	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-237	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Np-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
OBT	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pa-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pb-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Po-210	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-239	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-240	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Pu-241	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-223	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-224	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-225	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-226	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Ra-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Sr-90	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Tc-99	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-227	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-228	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-229	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-230	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-231	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-232	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
Th-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-233	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-234	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-235	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-236	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value
U-238	[]	1	CSA N288.1-14	cl. 6.15.4.3	default value

Contaminant	Unit	Value	Reference	Locations in Reference	Note
Ac-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ac-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is La.
Ag-108m	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0017	CSA N288.1-14	Table G.3	
Am-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Am-243	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00063	CSA N288.1-14	Table G.3	
Bi-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0015	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sb.
C-14	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Ca-41	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sr.
Cl-36	(Bq/kg(dw plant))/(Bq/kg(dw soil))	89	CSA N288.1-14	Table G.3	
Cm-244	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00021	CSA N288.1-14	Table G.3	
Co-60	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.047	CSA N288.1-14	Table G.3	
Cs-137	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.053	CSA N288.1-14	Table G.3	
Eu-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-154	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Eu-155	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.018	CSA N288.1-14	Table G.3	
Fe-55	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.005	CSA N288.1-14	Table G.3	
Gd-152	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.028	CSA N288.1-14	Table G.3	
HTO	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
I-129	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.05	CSA N288.1-14	Table G.3	
Nb-94	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.029	CSA N288.1-14	Table G.3	
Ni-59	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Ni-63	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.47	CSA N288.1-14	Table G.3	
Np-237	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
Np-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0084	CSA N288.1-14	Table G.3	
OBT	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0	Not Applicable		handled by specific activity model
Pa-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pa-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.038	CSA N288.1-14	Table G.3	
Pb-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.41	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Sn.
Po-210	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.063	EcoMetrix Estimation 2017		The Value is assume to be the same as for the surrogate element. The surrogate element is in the same group in periodic table. The surrogate element is Te.
Pu-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-239	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-240	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Pu-241	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.00014	CSA N288.1-14	Table G.3	
Ra-223	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-224	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-225	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-226	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Ra-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.11	CSA N288.1-14	Table G.3	
Sr-90	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.87	CSA N288.1-14	Table G.3	
Tc-99	(Bq/kg(dw plant))/(Bq/kg(dw soil))	3.7	CSA N288.1-14	Table G.3	
Th-227	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-228	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-229	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-230	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-231	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-232	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
Th-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.0033	CSA N288.1-14	Table G.3	
U-233	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-234	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-235	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-236	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	
U-238	(Bq/kg(dw plant))/(Bq/kg(dw soil))	0.01	CSA N288.1-14	Table G.3	

Parameter Name	Unit	Value	Reference	Locations in Reference	Note
Yield	kg(fw)/m2	2.1	CSA N288.1-14	cl. 6.3.7.2, Table G.5	Yc; value for potatoes
Removal Half Life	days	28	CSA N288.1-14	cl. 6.4.4	lambda(p); removal constant
Effective Deposition Duration	days	365	Not in DRL Guidance	EcoMetrix Suggestion	Plant grows over mutliple years
Foliar Interception Fraction	[]	0.5	CSA N288.1-14	cl. 6.4.1, Table G.5	fint; value for potatoes
Water Retained PerLeaf Area	L/m2	0.1	CSA N288.1-14	cl. 7.3.1.2	lwt
Harvest Index	[]	0.8	CSA N288.1-14	cl. 6.3.7.2, Table G.5	hi; value for potatoes
Holdup Time	s	86400	CSA N288.1-14	cl. 6.10.1.3	th; default value for animals (1 day)
Irrigation Frequency	1/s	0.00000334	CSA N288.1-14	cl. 7.3.1.2	ni; 20 times spread over hottest 10 weeks of the growing season
Leaf Area Index	[]	3	CSA N288.1-14	cl. 7.3.1.2, Table G.5	LAI; value for potatoes
Dry Fresh Weight Ratio	kg(dw)/kg(fw)	0.21	CSA N288.1-14	Table G.5	DWp; value for potatoes
Isotopic Discrimination Factor	[]	0.7	CSA N288.1-14	cl. 6.4.8.4	IDp; default value for plants
HTO Reduction Factor	[]	0.68	CSA N288.1-14	cl. 6.4.6.3	RFp; default value for plants
Water Equivalent Of Dry Matter	L/kg(dw)	0.56	CSA N288.1-14	cl. 6.4.8.4	WEp; constant value for plants
Plant C Fraction From Air	[]	0.7	CSA N288.1-14	cl. 7.3.4.3	f(c_air); default value for aquatic release
Plant To Shoot Yield Ratio	[]	2	CSA N288.1-14	cl. 7.3.4.3	TS
Stable Carbon Concentration	g-C/kg(dw)	500	CSA N288.1-14	cl. 6.4.9.3	X4_C
Fraction of plant immersed in soil	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS
Fraction of plant above the soil surface	[]	0.5	EcoMetrix Suggestion 2014		OFs; called fraction of "time spent..." in dose eq'n of N288.6 cl. 7.3.4.1.3; value consistent with TS; equals OFa in dose eq'n of N288.6 cl. 7.3.4.1.4

Appendix C Sample Calculations

Table C.1: Sample Dose Calculation for a One Year Old On-Site Harvester for Cesium-137 During Demolition Activities - Closure

Cesium-137				
Environmental Media Concentrations		**Value**	**Unit**	**Source**
Outdoor Air Concentration	A	5.9E-04	Bq/m^3	Demolition_Max Loading
Soil Concentration	B	1.7E-01	Bq/kg (dw)	Demolition_Max Loading
Soil Dry Bulk Density (Clay)	C	1.4E+00	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	2.0E-01	m	CSA N288.1-14
Soil Surface Concentration	E = B * C * D * 1000 L/m^3	4.9E+01	Bq (dw)/ m^2	Calculated
Polygon Fraction Outdoor Air	AG	3.3E-01	Unitless	The harvest spends 1/3 of its time in each area (upwind, on-site, downwind)
Polygon Fraction Soil	AH	3.3E-01	Unitless	The harvest spends 1/3 of its time in each area (upwind, on-site, downwind)
Air Immersion Dose				
Fraction of Time at Location	F	1.2E-02	Unitless	The harvester is in the area 2 day per week
Outdoor Occupancy Factor	G	1.0E+00	Unitless	The harvester is outdoors 100% of time on site
Building Shielding Factor	H	5.0E-01	Unitless	CSA N288.1-14
Dose Conversion Factor (Immersion)	I	1.1E-06	$(Sv/y)/(Bq/m^3)$	CSA N288.1-14
Air Immersion Dose	J=A*F*(G+(1-G)*H)*I*AG	2.4E-12	Sv/y	Calculated
Air Inhalation Dose				
Inhalation Rate	K	1.8E+03	m^3/y	CSA N288.1-14
Dose Conversion Factor (Inhalation)	L	5.4E-09	Sv/Bq	CSA N288.1-14
Air Inhalation Dose	M= A*K*F*L*AG	2.3E-11	Sv/y	Calculated
External Soil Dose				
Dose reduction factor from surface roughness and terrain irregularities	N	7.0E-01	Unitless	CSA N288.1-14
Groundshine Shielding Factor	O	2.0E-01	Unitless	CSA N288.1-14
Dose Conversion Factor (Soil)	P	2.3E-08	$(Sv/y)/(Bq/m^2)$	CSA N288.1-14
Soil External Dose	Q=E*F*N*(G+(1-G)*O)*P*AH	3.05E-09	Sv/y	Calculated
Food Concentrations				
Fruits Concentration	R	1.2E+00	Bq/ kg (fw)	Demolition_Max Loading
Weekay Concentration	R'	7.3E-01	Bq/ kg (fw)	Demolition_Max Loading
Cedar Concentration	R"	2.5E-02	Bq/ kg (fw)	Demolition_Max Loading
Deer Concentration	S	7.1E+00	Bq/ kg (fw)	Demolition_Max Loading
Rabbit Concentration	T	2.4E+02	Bq/ kg (fw)	Demolition_Max Loading
Toddler Exposure Factors				
Intake Rate, Soil	U	6.1E-05	kg(dw)/d	CSA N288.1-14
Soil Exposure Frequency	V	5.2E+01	d/y	CSA N288.1-14
Intake Rate, Terrestrial Plants	W	8.0E+00	kg (fw)/y	CNL, 2018, scaled down for infant
Intake Rate, Terrestrial Animals	X	1.4E+00	kg (fw)/y	CNL, 2018, scaled down for infant
Fraction from Fruits	Y	2.6E-01	Unitless	CNL, 2018, scaled down for infant
Fraction from Weekay	Y'	2.5E-02	Unitless	CNL, 2018, scaled down for infant
Fraction from Cedar	Y"	4.8E-02	Unitless	CNL, 2018, scaled down for infant
Fraction from Deer	Z	1.9E-01	Unitless	CNL, 2018, scaled down for infant
Fraction from Rabbit	AA	8.8E-02	Unitless	CNL, 2018, scaled down for infant
Dose Conversion Factor (Food)	AB	1.2E-08	Sv/Bq	CSA N288.1-14
Internal Soil Dose				
Soil Internal Dose	AC = B*U*V*AB*AH	2.19E-12	Sv/y	Calculated
Dose from Terrestrial Plants Ingestion				
Dose from Terrestrial Plants Ingestion	AD=W*(R*Y+R'*Y'+R"*Y")*AB	3.08E-08	Sv/y	Calculated
Dose from Terrestrial Animals Ingestion				
Dose from Terrestrial Animals Ingestion	AE=X*(S*Z+T*AA)*AB	3.83E-07	Sv/y	Calculated
Total Dose				
Total Dose	AF= J+M+Q+AC+AD+AE	4.16E-07	Sv/y	Calculated (Note: The harvester dose presented in the ERA includes the dose from time spent at Farm A

Table C.2: Sample Exposure and Risk Calculation for a On-site Toddler Harvester for Cadmium for Post-Closure Period

Cadmium				
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.0E-05	mg/L	Post-closure - MAX
Distribution coefficient (Kd)	B	5.0E+02	L/kg (dw)	CSA N288.1-14 (Zn value used as a surrogate)
Winnipeg River Sediment Concentration	C = A * B	5.0E-03	mg/kg (dw)	Calculated
Soil Concentration	D	1.0E-06	mg/kg (dw)	Calculated using the Soil Model in IMPACT
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	E	1.0E+02	L/kg (fw)	IAEA, 2010
Benthic Invertebrate Tissue Concentration	F= A * E	1.0E-03	mg/kg (fw)	Calculated
Aquatic Plant Concentration				
Bioaccumulation Factor - Aquatic Plants	G	1.9E+04	L/kg (fw)	IAEA, 2010
Aquatic Plant Tissue Concentration	H= A *G	1.9E-01	mg/kg (fw)	Calculated
Fish Concentration				
Bioaccumulation Factor - Fish	I	1.4E+02	L/kg (fw)	Sheppard et al., 2010
Fish Tissue Concentration	J= A* I	1.4E-03	mg/kg (fw)	Calculated
Wild Waterfowl Concentration				
Wild Waterfowl Intake Rate, Water	K	6.0E-02	L/d	CSA N288.1-14
Wild Waterfowl Intake Rate, Sediment	L	1.2E-03	kg (dw)/d	US EPA, 1993
Wild Waterfowl Intake Rate, Food	M	2.4E-01	kg (fw)/d	CSA N288.1-14
Benthic Invertebrates Feed Type Fraction	N	4.0E-01	Unitless	Hart and Burt, 2013
Aquatic Plant Feed Type Fraction	O	6.0E-01	Unitless	Hart and Burt, 2013
Wild Waterfowl Ingestion Transfer Factor	P	1.7E+00	d/kg (fw)	CSA N288.1-14
Wild Waterfowl Concentration	Q = (A*K + C*L +F*M*N + H*M*O)*P	4.7E-02	mg/kg (fw)	Calculated
Forage Concentration				
Bioaccumulation Factor - Forage	R	2.7E-01	kg (dw) (soil)/ kg (dw) (plant)	IAEA, 2010
Dry Fresh Weight Ratio of Forage	S	2.0E-01	kg (dw) / kg (fw)	CSA N288.1-14
Forage Tissue Concentration	T= D*R*S	5.4E-08	mg/kg (fw)	Calculated
Moose Concentration				
Moose Intake Rate, Water	U	2.0E+01	L/d	FCSAP 2012
Moose Intake Rate, Soil	V	1.6E-01	kg (dw)/d	FCSAP 2012
Moose Intake Rate, Food	W	3.8E+01	kg (fw)/d	FCSAP 2012
Moose Intake Rate, Food	X	8.0E+00	kg (dw)/d	FCSAP 2012
Proportion in Diet - Aquatic Plants	X'	2.0E-01	Unitless	FCSAP 2012
Proportion in Diet - Forage	X''	8.0E-01	Unitless	FCSAP 2012
Moose Ingestion Transfer Factor	Y	2.2E-01	d/kg (fw)	CSA N288.1-14 (Zn value used as a surrogate)
Moose Concentration	Z= (A*U +D*V + X*T*X''+W*H*X')*Y	3.1E-01	mg/kg (fw)	Calculated
Toddler Exposure Factors				
Intake Rate, Fish	AA	2.6E-03	kg/d	CNL, 2018
Intake Rate, Wild Waterfowl	AB	2.1E-04	kg/d	CNL, 2018
Intake Rate, Moose	AC	7.3E-04	kg/d	CNL, 2018
Intake Rate, Weekay	AD	5.4E-04	kg/d	CNL, 2018
Days per year for food ingestion	AE	1.2E+02	d	Assumed
Oral RAF_{GRTI}	AF	1.0E+00	Unitless	Assumed
Body Weight	AG	1.7E+01	kg	HC, 2010
Toddler Dose				
Toddler Dose	AH= ((H*AD+J*AA + Q*AB +Z*AC)*AE*AF)/(AG*365)	7.01E-06	mg/kg bw/d	Calculated
Toddler Risk				
Toxicological Reference Value	AI	1.0E-03	mg/kg bw/d	HC, 2010
Hazard Quotient	AJ = AH/AI	7.0E-03	Unitless	Calculated

Table C.3: Sample Dose Calculation for Berries (Fruit) for Cesium-137 (Demolition (Max) at Site) during Closure

Cesium-137				
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Air Concentration	A	1.1E-03	Bq/m^3	Demolition_Max Loading
Site Soil Concentration	B	2.6E-01	Bq/kg (dw)	Demolition_Max Loading
Soil Dry Bulk Density (Clay)	C	1.4E+00	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	2.0E-01	m	CSA N288.1-14
Soil Surface Concentration	E = B * C * D * 1000 L/m^3	7.2E+01	Bq (dw)/ m^2	Calculated
Berries Internal Dose (radiological)				
Berries Tissue Concentration	F	2.0E+00	Bq/kg(fw)	Calculated
Dose Conversion Factor (Internal)	G	3.3E-04	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	H = F*G	6.6E-04	µGy/hr	Calculated
Internal Dose (converted units)	H' = H * 24 h/d / 1000 µGy/mGy	1.6E-05	mGy/d	Calculated
Berries External Dose (radiological)				
Occupancy Factor, Soil	I	0.5	unitless	Assumed
Occupancy Factor, Soil Surface, air	J	0.5	unitless	Assumed
Dose Conversion Factor (External, air)	K	0.0E+00	(µGy/hr)/(Bq/m^3)	-
Dose Conversion Factor (External, in soil)	L	0.0E+00	(µGy/hr)/(Bq/kg (dw))	-
Dose Conversion Factor (External, on soil)	M	1.3E-06	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Air to External Dose	N = J * K * A	0.0E+00	µGy/hr	Calculated
Contribution of Soil to External Dose	O = I * L * B	0.0E+00	µGy/hr	Calculated
Contribution of Soil Surface to External Dose	P = J* M * E	4.6E-05	µGy/hr	Calculated
External Dose	Q = N + O + P	4.6E-05	µGy/hr	Calculated
External Dose (converted units)	Q' = Q * 24 h/d / 1000 µGy/mGy	1.1E-06	mGy/d	Calculated
Berries Total Dose (radiological)				
Total Dose	R = H + Q	7.0E-04	µGy/hr	Calculated
Total Dose (converted units)	R' = H' + Q'	1.7E-05	mGy/d	Calculated

Table C.4: Sample Dose Calculation for American Robin for Cesium-137 (Demolition (Max) at Site) during Closure

Cesium-137				
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Air Concentration	A	1.1E-03	Bq/m3	Demolition_Max Loading
Site Soil Concentration	B	2.6E-01	Bq/kg (dw)	Demolition_Max Loading
Soil Dry Bulk Density (Clay)	C	1.4E+00	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	2.0E-01	m	CSA N288.1-14
Soil Surface Concentration	E = B * C * D * 1000 L/m^3	7.2E+01	Bq (dw)/ m^2	Calculated
American Robin Internal Dose (radiological)				
American Robin Tissue Concentration	F	1.08E+01	Bq/kg fw	Demolition_Max Loading
Dose Conversion Factor (Internal)	G	1.88E-04	(µGy/hr)/(Bq/kg fw)	ICRP 108 (2008)
Internal Dose	H = F * G	2.02E-03	µGy/hr	Calculated
Internal Dose (converted units)	H' = H * 24 h/d / 1000 µGy/mGy	4.86E-05	mGy/d	Calculated
American Robin External Dose (radiological)				
Occupancy Factor, Air	I	1	unitless	Assumed
Occupancy Factor, Soil	J	0	unitless	Assumed
Occupancy Factor, Soil Surface	K	1	unitless	Assumed
Dose Conversion Factor (External, air)	L	0.00E+00	(µGy/hr)/(Bq/m^3)	-
Dose Conversion Factor (External, in soil)	M	0.00E+00	(µGy/hr)/(Bq/kg)	-
Dose Conversion Factor (External, on soil)	N	1.79E-06	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Air to External Dose	O = I * L * A	0.00E+00	µGy/hr	Calculated
Contribution of Soil to External Dose	P = J * M *B	0.00E+00	µGy/hr	Calculated
Contribution of Soil Surface to External Dose	Q = K* N * E	1.28E-04	µGy/hr	Calculated
External Dose	R = O + P+ Q	1.28E-04	µGy/hr	Calculated
External Dose (converted units)	R' = R * 24 h/d / 1000 µGy/mGy	3.08E-06	mGy/d	Calculated
American Robin Total Dose (radiological)				
Total Dose	S = H + R	2.15E-03	µGy/hr	Calculated
Total Dose (converted units)	S' = H' + R'	5.17E-05	mGy/d	Calculated

Table C.5: Sample Dose Calculation for American Robin for Tritium (Demolition (Max) at Site) during Closure

	Tritium			
		Value	Unit	Source
Environmental Media Concentrations				
Air Concentration	A	3.69E-02	Bq/m^3	Demolition_Max Loading
Site Soil Concentration	B	0.00E+00	Bq/kg (dw)	Demolition_Max Loading
Soil Dry Bulk Density (Clay)	C	1.40E+00	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	2.00E-01	m	CSA N288.1-14
Soil Surface Concentration	E = B * C * D * 1000 L/m^3	0.00E+00	Bq (dw)/ m^2	Calculated
Fruit and Soil Invertebrate Concentrations				
Reduction Factor	F	6.80E-01	Unitless	CSA N288.1-14
Dry/Fresh Weight Ratio for Fruit	G	1.00E-01	kg (dw)/kg (fw)	CSA N288.1-14
Dry/Fresh Weight Ratio for Soil Invertebrates	H	1.70E-01	kg (dw)/kg (fw)	Beresford et al., 2008
Atmospheric Absolute Humidity Growing Season	I	1.01E-02	L/m^3	EC 2011-2015 average, Pinawa
Transfer Parameter From Air HTO (and Soil HTO) to HTO in Plants	J = F * (1-G)/I	6.08E+01	m^3/kg (fw)	Calculated
Transfer Parameter From Air HTO (and Soil HTO) to HTO in Soil Invertebrates	K = F * (1-H)/I	5.61E+01	m^3/kg (fw)	Calculated
Fruit Tissue Concentration	L = J * A	2.25E+00	Bq/kg (fw)	Calculated
Soil Invertebrate Tissue Concentration	M = K * A	2.07E+00	Bq/kg (fw)	Calculated
American Robin Feed Type Fraction				
Fruit	N	6.0E-01	Unitless	FCSAP, 2012
Soil Invertebrates	O	4.0E-01	Unitless	FCSAP, 2012
American Robin Internal Dose (radiological)				
Water Intake Fraction from Inhalation	P	0.009	Unitless	CSA N288.1-14
Dry/Fresh Weight Ratio of Animal Product	Q	3.0E-01	kg (dw)/ kg (fw)	CSA N288.1-14
Atmospheric Absolute Humidity Annual Average	R	5.5E-03	L/m^3	EC 2011-2015 average, Pinawa
Transfer of HTO to American Robin Through Air	S = P * (1-Q)/R	1.1E+00	m^3/kg (fw)	Calculated
Fraction of HTO in OBT form	T	1.0E-01	Unitless	CSA N288.1-14
Water Intake Fraction in Feed	U	6.5E-01	Unitless	CSA N288.1-14
Water Intake Fraction in Dry Matter	V	1.2E-01	Unitless	CSA N288.1-14
Transfer of HTO to American Robin Through Fruit	W=((1-T)* U + 0.5 * V) *(1-Q)/(1-G)	5.0E-01	Unitless	Calculated
Transfer of HTO to American Robin Through Soil Invertebrates	X=((1-T)* U + 0.5 * V) *(1-Q)/(1-H)	5.4E-01	Unitless	Calculated
American Robin Tissue Concentration	Y= S*A + W * L * N + X * M *O	1.2E+00	Bq/kg (fw)	Calculated
Dose Conversion Factor (Internal)	Z	5.76E-06	(µGy/hr)/(Bq/kg fw)	ICRP 108 (2008)
Internal Dose	AA = Z * Y	6.74E-06	µGy/hr	Calculated
Internal Dose (converted units)	AA' = AA * 24 h/d / 1000 µGy/mGy	1.62E-07	mGy/d	Calculated
American Robin External Dose (radiological)				
Occupancy Factor, Air	AB	1	unitless	Assumed
Occupancy Factor, Soil	AC	0	unitless	Assumed
Occupancy Factor, Soil Surface, air	AD	1	unitless	Assumed
Dose Conversion Factor (External, air)	AE	0.00E+00	(µGy/hr)/(Bq/m^3)	-
Dose Conversion Factor (External, in soil)	AF	0.00E+00	(µGy/hr)/(Bq/kg)	-
Dose Conversion Factor (External, on soil)	AG	0.00E+00	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Air to External Dose	AH = AB * AE *A	0.00E+00	µGy/hr	Calculated
Contribution of Soil to External Dose	AI = AC * AF *B	0.00E+00	µGy/hr	Calculated
Contribution of Soil Surface to External Dose	AJ = AD * AG * E	0.00E+00	µGy/hr	Calculated
External Dose	AK = AH + AI + AJ	0.00E+00	µGy/hr	Calculated
External Dose (converted units)	AK' = AK * 24 h/d / 1000 µGy/mGy	0.00E+00	mGy/d	Calculated
American Robin Total Dose (radiological)				
Total Dose	AL = AA + AK	6.74E-06	µGy/hr	Calculated
Total Dose (converted units)	AL' = AA' + AK'	1.62E-07	mGy/d	Calculated

Table C.6: Sample Dose Calculation for Aquatic Plants for Chlorine-36 (Near Site-WR1 Leach) - Post-Closure

Chlorine-36				
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.58E-10	Bq/L	Post-closure - MAX
Winnipeg River Sediment Concentration	B	5.95E-11	Bq/kg (dw)	Post-closure - MAX
Aquatic Plant Internal Dose (radiological)				
Bioaccumulation Factor - Aquatic Plants	C	5.0E+01	L/kg(fw)	CSA N288.1-14
Aquatic Plant Tissue Concentration	D = C * A	7.9E-09	Bq/kg(fw)	Calculated
Dose Conversion Factor (Internal)	E	1.5E-04	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	F= E * D	1.2E-12	µGy/hr	Calculated
Internal Dose (converted units)	F' = F * 24 h/d / 1000 µGy/mGy	2.8E-14	mGy/d	Calculated
Aquatic Plant External Dose (radiological)				
Occupancy Factor, Water	G	1	unitless	Assumed
Occupancy Factor, Water Surface	H	0	unitless	Assumed
Occupancy Factor, Sediment	I	0	unitless	Assumed
Occupancy Factor, Sediment Surface	J	0	unitless	Assumed
Dose Conversion Factor (External)	K	1.4E-05	(µGy/hr)/(Bq/L)	ICRP 108 (2008)
Contribution of Water to External Dose	L = K*(G + 0.5*H + 0.5*J)*A	2.2E-15	µGy/hr	Calculated
Contribution of Sediment to External Dose	M= K*(I + 0.5*J)*B	0.0E+00	µGy/hr	Calculated
External Dose	N = L + M	2.2E-15	µGy/hr	Calculated
External Dose (converted units)	N' = N * 24 h/d / 1000 µGy/mGy	5.2E-17	mGy/d	Calculated
Aquatic Plant Total Dose (radiological)				
Total Dose	O = F + N	1.2E-12	µGy/hr	Calculated
Total Dose (converted units)	O' = F' + N'	2.8E-14	mGy/d	Calculated

Table C.7: Sample Dose Calculation for Aquatic Plants for Tritium (Near Site-WR1 Leach) - Post-Closure

	Tritium			
		Value	Unit	Source
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	2.54E-01	Bq/L	Post-closure - MAX
Winnipeg River Sediment Concentration	B	0.00E+00	Bq/kg (dw)	Post-closure - MAX
Aquatic Plant Internal Dose (radiological)				
Bioaccumulation Factor - Aquatic Plants	C	7.5E-01	L/kg(fw)	CSA N288.1-14
Aquatic Plant Tissue Concentration	D = C * A	1.9E-01	Bq/kg(fw)	Calculated
Dose Conversion Factor (Internal)	E	5.8E-06	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	F= E * D	1.1E-06	µGy/hr	Calculated
Internal Dose (converted units)	F' = F * 24 h/d / 1000 µGy/mGy	2.6E-08	mGy/d	Calculated
Aquatic Plant External Dose (radiological)				
Occupancy Factor, Water	G	1	unitless	Assumed
Occupancy Factor, Water Surface	H	0	unitless	Assumed
Occupancy Factor, Sediment	I	0	unitless	Assumed
Occupancy Factor, Sediment Surface	J	0	unitless	Assumed
Dose Conversion Factor (External)	K	2.3E-09	(µGy/hr)/(Bq/L)	ICRP 108 (2008)
Contribution of Water to External Dose	L = K*(G + 0.5*H + 0.5*J)*A	5.9E-10	µGy/hr	Calculated
Contribution of Sediment to External Dose	M= K*(I + 0.5*J)*B	0.0E+00	µGy/hr	Calculated
External Dose	N = L + M	5.9E-10	µGy/hr	Calculated
External Dose (converted units)	N' = N * 24 h/d / 1000 µGy/mGy	1.4E-11	mGy/d	Calculated
Aquatic Plant Total Dose (radiological)				
Total Dose	O = F + N	1.1E-06	µGy/hr	Calculated
Total Dose (converted units)	O' = F' + N'	2.6E-08	mGy/d	Calculated

Table C.8: Sample Calculation for Wild Waterfowl Dose for C-14 (Near Site-WR1 Leach) - Post-Closure

		HTO		
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.02E-03	Bq/L	Post-closure - MAX
Winnipeg River Sediment Concentration	B	5.12E-02	Bq/kg (dw)	Post-closure - MAX
Sediment Dry Bulk Density	C	0.4	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	0.05	m	Assumed
Winnipeg River Sediment Surface Concentration	E = B * C * D * 1000 L/m^3	1.02E+00	Bq (dw)/ m^2	Calculated
Aquatic Plant Concentration				
Bioaccumulation Factor - Aquatic Plants	F	5.9E+03	L/kg(fw)	CSA N288.1-14
Aquatic Plant Tissue Concentration	G= A* F	6.0E+00	Bq/kg(fw)	Calculated
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	H	5.2E+03	L/kg (fw)	CSA N288.1-14
Benthic Invertebrate Tissue Concentration	I= A* H	5.3E+00	Bq/kg (fw)	Calculated
Wild Waterfowl Feed Type Fraction				
Aquatic Plant	J	6.0E-01	Unitless	Hart and Burt, 2013
Benthic Invertebrates	K	4.0E-01	Unitless	Hart and Burt, 2013
Wild Waterfowl Internal Dose (radiological)				
Stable Carbon Concentration in Wild Waterfowl	L	2.4E+02	g-C/kg (fw)	CSA N288.1-14
Stable Carbon Concentration in Aquatic Plants	M	1.3E+02	g-C/kg (fw)	CSA N288.1-14
Stable Carbon Concentration in Benthic Invertebrates	N	1.1E+02	g-C/kg (fw)	CSA N288.1-14
Transfer of C-14 to Wild Waterfowl Through Aquatic Plants	O = (L/M)	2.0E+00	Unitless	Calculated
Transfer of C-14 to Wild Wildfowl Through Benthic Invertebrates	P = (L/N)	2.2E+00	Unitless	Calculated
Wild Waterfowl Tissue Concentration	Q= O*G*J +P*I*K	1.2E+01	Bq/kg (fw)	Calculated
Dose Conversion Factor (Internal)	R	2.8E-05	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	S = R * Q	3.3E-04	µGy/hr	Calculated
Internal Dose (converted units)	S' = S * 24 h/d / 1000 µGy/mGy	8.0E-06	mGy/d	Calculated
Wild Waterfowl External Dose (radiological)				
Occupancy Factor, Sediment	T	0	unitless	Assumed
Occupancy Factor, Sediment Surface	U	0.5	unitless	Assumed
Dose Conversion Factor (External, in sediment)	V	0.0E+00	(µGy/hr)/(Bq/kg)	-
Dose Conversion Factor (External, on sediment)	W	0.0E+00	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Sediment to External Dose	X = V * T * B	0.0E+00	µGy/hr	Calculated
Contribution of Sediment Surface to External Dose	Y = W * U * E	0.0E+00	µGy/hr	Calculated
External Dose	Z = X + Y	0.0E+00	µGy/hr	Calculated
External Dose (converted units)	Z' = Z * 24 h/d / 1000 µGy/mGy	0.0E+00	mGy/d	Calculated
Wild Waterfowl Total Dose (radiological)				
Total Dose	AA= S + Z	3.3E-04	µGy/hr	Calculated
Total Dose (converted units)	AA' = S' + Z'	8.0E-06	mGy/d	Calculated

Table C.9: Sample Dose Calculation for Wild Waterfowl for Chlorine-36 (Near Site-WR1 Leach) - Post-Closure

Chlorine-36				
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.6E-10	Bq/L	Post-closure - MAX
Winnipeg River Sediment Concentration	B	3.2E-09	Bq/kg (dw)	Post-closure - MAX
Sediment Dry Bulk Density	C	0.4	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	0.05	m	Assumed
Winnipeg River Sediment Surface Concentration	E = B * C * D * 1000 L/m^3	6.3E-08	Bq (dw)/ m^2	Calculated
Aquatic Plant Concentration				
Bioaccumulation Factor - Aquatic Plants	F	5.0E+01	L/kg(fw)	CSA N288.1-14
Aquatic Plant Tissue Concentration	G= A* F	7.9E-09	Bq/kg(fw)	Calculated
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	H	1.4E+02	L/kg (fw)	CSA N288.1-14
Benthic Invertebrate Tissue Concentration	I= A* H	2.2E-08	Bq/kg (fw)	Calculated
Wild Waterfowl Exposure Factors				
Intake Rate, Water	J	6.0E-02	L/d	CSA N288.1-14
Intake Rate, Sediment	K	1.2E-03	kg (dw)/d	CSA N288.1-14
Intake Rate, Aquatic Plant	L	2.4E-01	kg/d (fw)	CSA N288.1-14
Intake Rate, Benthic Invertebrates	M	2.4E-01	kg/d (fw)	CSA N288.1-14
Wild Waterfowl Feed Type Fraction				
Aquatic Plant	N	6.0E-01	Unitless	Hart and Burt, 2013
Benthic Invertebrates	O	4.0E-01	Unitless	Hart and Burt, 2013
Wild Waterfowl Internal Dose (radiological)				
Biotransfer Factor - Wild Waterfowl	P	1.8E+00	d/kg (fw)	CSA N288.1-14
Wild Waterfowl Tissue Concentration	Q = P*(A*J+B*K+G*L*N+I*M*O)	5.7E-09	Bq/kg (fw)	Calculated
Dose Conversion Factor (Internal)	R	1.6E-04	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	S = O * P	9.1E-13	µGy/hr	Calculated
Internal Dose (converted units)	S' = S * 24 h/d / 1000 µGy/mGy	2.2E-14	mGy/d	Calculated
Wild Waterfowl External Dose (radiological)				
Occupancy Factor, Sediment	T	0	unitless	Assumed
Occupancy Factor, Sediment Surface	U	0.5	unitless	Assumed
Dose Conversion Factor (External, in sediment)	V	0.0E+00	(µGy/hr)/(Bq/kg)	-
Dose Conversion Factor (External, on sediment)	W	5.0E-10	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Sediment to External Dose	X = V * T *B	0.0E+00	µGy/hr	Calculated
Contribution of Sediment Surface to External Dose	Y = W* U * E	1.6E-17	µGy/hr	Calculated
External Dose	Z = X + Y	1.6E-17	µGy/hr	Calculated
External Dose (converted units)	Z' = Z * 24 h/d / 1000 µGy/mGy	3.8E-19	mGy/d	Calculated
Wild Waterfowl Total Dose (radiological)				
Total Dose	AA = S + Z	9.1E-13	µGy/hr	Calculated
Total Dose (converted units)	AA' = S' + Z'	2.2E-14	mGy/d	Calculated

Table C.10: Sample Dose Calculation for Wild Waterfowl Tritium (Near Site-WR1 Leach) - Post-Closure

	Tritium			
		Value	Unit	Source
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	2.54E-01	Bq/L	Post-closure - MAX
Winnipeg River Sediment Concentration	B	0.00E+00	Bq/kg (dw)	Post-closure - MAX
Sediment Dry Bulk Density	C	0.4	kg (dw)/ L	CSA N288.1-14
Mixing Depth	D	0.05	m	Assumed
Winnipeg River Sediment Surface Concentration	E = B * C * D * 1000 L/m^3	0	Bq (dw)/ m^2	Calculated
Aquatic Plant Concentration				
Bioaccumulation Factor - Aquatic Plants	F	7.5E-01	L/kg(fw)	CSA N288.1-14
Aquatic Plant Tissue Concentration	G= A* F	1.9E-01	Bq/kg(fw)	Calculated
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	H	7.5E-01	L/kg (fw)	CSA N288.1-14
Benthic Invertebrate Tissue Concentration	I= A* H	1.9E-01	Bq/kg (fw)	Calculated
Wild Waterfowl Feed Type Fraction				
Aquatic Plant	J	6.0E-01	Unitless	Hart and Burt, 2013
Benthic Invertebrates	K	4.0E-01	Unitless	Hart and Burt, 2013
Wild Waterfowl Internal Dose (radiological)				
Water Intake Fraction in Drinking Water	L	2.2E-01	Unitless	CSA N288.1-14
Dry/Fresh Weight Ratio of Animal Product	M	3.0E-01	kg (dw)/ kg (fw)	CSA N288.1-14
Transfer of HTO to Animals Through Water	N= L*(1 - M)	1.5E-01	L/kg (fw)	Calculated
Fraction of HTO in OBT Form	O	1.0E-01	Unitless	CSA N288.1-14
Water Intake Fraction in Feed	P	6.5E-01	Unitless	CSA N288.1-14
Water Intake Fraction in Dry Matter	Q	1.2E-01	Unitless	CSA N288.1-14
Dry/Fresh Weight Ratio of Aquatic Plant/Benthic Invertebrates	R	2.5E-01	kg (dw)/ kg (fw)	CSA N288.1-14
Transfer of HTO to Wild Waterfowl Through Feed	S=((1-O)*P + 0.5 * Q) *(1-M)/(1-R)	6.0E-01	Unitless	Calculated
Wild Waterfowl Tissue Concentration	T= (N*A) + S*(G*J +I*K)	1.5E-01	Bq/kg (fw)	Calculated
Dose Conversion Factor (Internal)	U	5.8E-06	(µGy/hr)/(Bq/kg (fw))	ICRP 108 (2008)
Internal Dose	V = U * T	8.9E-07	µGy/hr	Calculated
Internal Dose (converted units)	V' = V * 24 h/d / 1000 µGy/mGy	2.1E-08	mGy/d	Calculated
Wild Waterfowl External Dose (radiological)				
Occupancy Factor, Sediment	W	0	unitless	Assumed
Occupancy Factor, Sediment Surface	X	0.5	unitless	Assumed
Dose Conversion Factor (External, in sediment)	Y	0.0E+00	(µGy/hr)/(Bq/kg)	-
Dose Conversion Factor (External, on sediment)	Z	0.0E+00	(µGy/hr)/(Bq/m^2)	ICRP 108 (2008)
Contribution of Sediment to External Dose	AA = Y * W * B	0.0E+00	µGy/hr	Calculated
Contribution of Sediment Surface to External Dose	AB = Z * X * E	0.0E+00	µGy/hr	Calculated
External Dose	AC = AA + AB	0.0E+00	µGy/hr	Calculated
External Dose (converted units)	AC' = AC * 24 h/d / 1000 µGy/mGy	0.0E+00	mGy/d	Calculated
Wild Waterfowl Total Dose (radiological)				
Total Dose	AD= V + AC	8.9E-07	µGy/hr	Calculated
Total Dose (converted units)	AD' = V' + AC'	2.1E-08	mGy/d	Calculated

Table C.11: Sample Calculation for Wild Waterfowl Dose for Cadmium (Near Site-WR1 Leach) - Post-Closure

		Cadmium		
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.00E-05	mg/L	Surface Water Section of EIS and ERA Report
Distribution coefficient (Kd)	B	5.00E+02	L/kg (dw)	CSA N288.1-14 (Using Zn value as a surrogate)
Winnipeg River Sediment Concentration	C= A * B	5.00E-03	mg/kg (dw)	Calculated
Aquatic Plant Concentration				
Bioaccumulation Factor - Aquatic Plants	D	1.9E+04	L/kg (fw)	IAEA, 2010
Aquatic Plant Tissue Concentration	E= A* D	1.9E-01	mg/kg (fw)	Calculated
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	F	1.0E+02	L/kg (fw)	IAEA, 2010
Benthic Invertebrate Tissue Concentration	G= A* F	1.0E-03	mg/kg (fw)	Calculated
Wild Waterfowl Exposure Factors				
Intake Rate, Water	H	6.0E-02	L/d	CSA N288.1-14
Intake Rate, Sediment	I	1.2E-03	kg (dw)/d	US EPA, 1993
Intake Rate, Food	J	2.4E-01	kg (fw)/d	CSA N288.1-14
Wild Waterfowl Feed Type Fraction				
Aquatic Plant	K	6.0E-01	Unitless	Hart and Burt, 2013
Benthic Invertebrates	L	4.0E-01	Unitless	Hart and Burt, 2013
Wild Waterfowl Weight				
Weight	M	1.1E+00	kg	CSA N288.1-14
Wild Waterfowl Dose (non-radiological)				
Dose	N = (A*H + C*I + E*J*K + G*J*L)/M	2.4E-02	mg/kg bw/day	Calculated
Risk (non- radiological)				
Toxicological Reference Value	O	2.0E+01	mg kg bw/day	White and Finley, 1978 (cited in Sample et al., 1996)
Hazard Quotient	P= N / O	1.2E-03	Unitless	

Table C.12: Sample Calculation for American Mink for Cadmium (Near Site-WR1 Leach) - Post-Closure

		Cadmium		
		Value	**Unit**	**Source**
Environmental Media Concentrations				
Winnipeg River Water Concentration	A	1.00E-05	mg/L	Surface Water Section of EIS and ERA Report
Distribution coefficient (Kd)	B	5.00E+02	L/kg (dw)	CSA N288.1-14 (Using Zn value as a surrogate)
Winnipeg River Sediment Concentration	C= A * B	5.00E-03	mg/kg (dw)	Calculated
Benthic Invertebrate Concentration				
Bioaccumulation Factor - Benthic Invertebrates	D	1.0E+02	L/kg (fw)	IAEA, 2010
Benthic Invertebrate Tissue Concentration	E= A* D	1.0E-03	mg/kg (fw)	Calculated
Fish Concentration				
Bioaccumulation Factor - Fish	F	1.4E+02	L/kg (fw)	Sheppard et al., 2010
Fish Tissue Concentration	G= A* F	1.4E-03	mg/kg (fw)	Calculated
American Mink Exposure Factors				
Intake Rate, Water	H	2.5E-02	L/d	US EPA, 1993
Intake Rate, Sediment	I	5.7E-04	kg (dw)/d	FCSAP, 2012
Intake Rate, Food	J	1.1E-01	kg (fw)/d	US EPA, 1993
American Mink Feed Type Fraction				
Benthic Invertebrates	K	1.5E-01	Unitless	US EPA, 1993
Fish	L	8.5E-01	Unitless	US EPA, 1993
American Mink Weight				
Weight	M	8.2E-01	kg	US EPA, 1993
American Mink Dose (non-radiological)				
Dose	N = (A*H + C*I + E*J*K + G*J*L)/M	1.9E-04	mg/kg bw/day	Calculated
Risk (non- radiological)				
Toxicological Reference Value	O	1.0E+01	mg kg bw/day	Sutou et al., 1980 (cited in Sample et al., 1996)
Hazard Quotient	P= N / O	1.9E-05	Unitless	

Appendix D Evaluation of Disruptive Scenarios

Appendix D Evaluation of Disruptive Event Scenarios

1.0 Introduction

There are three disruptive event scenarios that were considered as worst cases. These include:

- Human intrusion into WRDF and exposure of waste – intrusion into the WRDF by an exploration borehole;
- Well in plume – an on-site resident drinking groundwater from a well capturing the plume from WRDF; and
- WRDF Barrier failure.

Each of these disruptive event scenarios are described below.

2.0 Human Intrusion

In this disruptive event scenario, it was assumed that following the minimum 100 years of institutional control, there is human intrusion into the WRDF which results in exposure to solid waste that is brought to the surface. An exploration borehole was drilled through the engineered cover, grout, cement, and WRDF from ground surface to bedrock following the 100-year institutional control period. This is an unlikely scenario, but is considered as a conservative assessment for the disruptive events.

The waste material encountered in the borehole would be brought to surface, handled by the driller, and dumped on the ground. Once the driller had left, trespassers would spend time at the drill location.

2.1 Characterization of the Exploration Borehole

A depth of 19 m to bedrock was used based on an average bedrock depth from EIS Section 6.3.2. The engineered cover was assumed to be 1 m. Based on published typical diameters for exploratory boreholes, the inside diameter may range from approximately 1.5 to 3.5 inches (Boart Longyear, 2014). A borehole diameter of 4 inches was used as this is the largest realistic exploratory drill. The portion of contaminated “soil” in the reactor versus the clean “soil” in the cover was calculated to be 0.947. Concentrations were multiplied by this portion to represent the dilution of waste material by mixing with clean cover soil when brought to surface.

2.2 Receptor Selection and Characterization

The driller was assumed to be an adult who takes 1 hour to drill the borehole. This is the duration of the driller’s exposure.

The trespassers include an adult, a 10 year old child, a 1 year old infant, and a 3 month old for radionuclides, and an adult and toddler for non-radionuclides. The difference in receptors is because N288.6 (2012) states that radionuclide assessment will follow CSA N288.1 (2014) and non-radionuclide assessment follows Health Canada (2010a). Therefore, receptors differ between the parameter types. Receptors spend 1 hour every day (snow free) on-site.

These receptors would not be exposed in any other way.

2.3 Selection of Radionuclides and Non-Radionuclides

Radiological and non-radiological contaminants associated with WRDF were modeled with GoldSim® (Version 11.1). The dissolved mass and the mass waiting to be added to the mixing cell were summed to estimate a total mass concentration in the waste material.

Concentrations were received in g/m^3. For radionuclides, the equation shown in Section 3.2.1 of the ERA and the density of the waste was used to convert this to Bq/kg (Table D-1). For non-radiological contaminants the received concentration was divided by the density of the waste to convert the concentrations to mg/kg (Table D-2). The density of the remainder of WR-1 Complex foundation and grout filling used in the groundwater model was 2,100 mg/m^3 and was used as the density of material in the borehole for this assessment. The concentration was adjusted by a factor of 0.947 to account for mixing of the clean “soil” in the cover with the waste material.

Table D-1: Concentration of Radionuclides in WRDF Post-Closure

Radionuclide	Concentration (g/m^3)	Atomic mass (g/mol)	Half-life (s)	Concentration (Bq/kg)
Ac-225	4.38E-18	225.02	8.64E+05	4.24E-06
Ac-227	3.01E-13	227.03	6.87E+08	3.63E-04
Ag-108m	1.84E-08	107.91	1.38E+10	2.33E+00
Am-241	1.86E-05	241.06	1.36E+10	1.07E+03
Am-243	2.58E-07	243.06	2.32E+11	8.59E-01
Bi-210	4.66E-18	209.98	4.33E+05	9.66E-06
C-14	2.63E-03	14.00	1.81E+11	1.96E+05
Ca-41	4.21E-06	40.96	3.22E+12	6.01E+00
Cl-36	2.45E-10	35.97	9.46E+12	1.36E-04
Cm-244	6.88E-11	244.06	5.71E+08	9.30E-02
Co-60	7.37E-11	59.93	1.67E+08	1.38E+00
Cs-137	6.66E-07	137.91	9.51E+08	9.55E+02
Eu-152	2.40E-11	151.92	4.26E+08	6.98E-02
Eu-154	3.56E-12	153.92	2.71E+08	1.61E-02
Eu-155	7.13E-17	154.92	1.50E+08	5.77E-07
Fe-55	3.41E-18	54.94	8.51E+07	1.37E-07

Radionuclide	Concentration (g/m^3)	Atomic mass (g/mol)	Half-life (s)	Concentration (Bq/kg)
Gd-152	8.80E-09	151.92	3.41E+21	3.20E-12
H-3	3.68E-07	3.02	3.89E+08	5.91E+04
I-129	3.04E-06	128.90	4.95E+14	8.98E-03
Nb-94	6.36E-02	93.91	6.40E+11	1.99E+05
Nd-144	2.69E-34	143.91	7.22E+22	4.87E-39
Ni-59	5.52E-01	58.93	3.19E+12	5.53E+05
Ni-63	2.92E-02	62.93	3.15E+09	2.77E+07
Np-237	8.77E-06	237.05	6.75E+13	1.03E-01
Np-239	2.22E-13	239.05	2.04E+05	8.59E-01
Pa-231	4.81E-10	231.04	1.03E+12	3.80E-04
Pa-233	2.97E-13	233.04	2.33E+06	1.03E-01
Pb-210	7.55E-15	209.98	7.03E+08	9.63E-06
Po-210	1.27E-16	209.98	1.19E+07	9.59E-06
Pu-238	1.63E-07	238.05	2.77E+09	4.65E+01
Pu-239	2.86E-04	239.05	7.60E+11	2.97E+02
Pu-240	1.10E-04	240.05	2.07E+11	4.19E+02
Pu-241	1.70E-08	241.06	4.42E+08	3.01E+01
Ra-223	4.24E-16	223.02	9.88E+05	3.63E-04
Ra-224	1.87E-23	224.02	3.14E+05	5.01E-11
Ra-225	6.53E-18	225.02	1.29E+06	4.24E-06
Ra-226	5.33E-13	226.03	5.05E+10	8.79E-06
Ra-228	1.10E-20	228.03	1.80E+08	5.04E-11
Rn-222	3.43E-18	222.02	3.30E+05	8.80E-06
Sm-148	1.02E-20	147.91	2.21E+23	5.89E-26
Sr-90	3.22E-07	89.91	9.08E+08	7.42E+02
Tc-99	1.88E-05	98.91	6.65E+12	5.37E+00
Th-227	6.96E-16	227.03	1.61E+06	3.58E-04
Th-228	3.63E-21	228.03	6.03E+07	4.97E-11
Th-229	1.20E-12	229.03	2.30E+11	4.27E-06
Th-230	2.92E-10	230.03	2.38E+12	1.00E-04
Th-231	8.80E-15	231.04	9.19E+04	7.81E-02
Th-232	2.82E-11	232.04	4.45E+17	5.15E-11
Th-234	1.57E-12	234.04	2.08E+06	6.05E-01
U-233	7.68E-10	233.04	5.02E+12	1.24E-04
U-234	3.43E-07	234.04	7.74E+12	3.56E-02
U-235	2.17E-03	235.04	2.22E+16	7.82E-02
U-236	2.56E-06	236.05	7.40E+14	2.76E-03
U-237	5.29E-16	237.05	5.83E+05	7.21E-04

Radionuclide	Concentration (g/m^3)	Atomic mass (g/mol)	Half-life (s)	Concentration (Bq/kg)
U-238	1.08E-01	238.05	1.41E+17	6.05E-01
Y-90	8.18E-11	89.91	2.31E+05	7.43E+02

Table D-2: Concentration for Non-Radionuclide in WRDF Post-Closure

Non-Radionuclide	Concentration (g/m^3)	Concentration (mg/kg)
Argon	8.72E-14	3.94E-14
Boron	7.67E-05	3.46E-05
Barium	2.06E-05	9.31E-06
Bismuth	2.09E-14	9.42E-15
Cadmium	8.91E+00	4.02E+00
Cobalt	3.02E-02	1.36E-02
Chromium	1.50E+01	6.78E+00
Copper	7.66E-02	3.45E-02
Gadolinium	3.36E-07	1.51E-07
HB-40	1.30E+04	5.85E+03
Helium	1.85E-04	8.34E-05
Mercury	3.03E-02	1.37E-02
Potassium	3.59E-09	1.62E-09
Potassium hydroxide	4.05E-04	1.83E-04
Manganese	5.04E-03	2.27E-03
Molybdenum	1.32E-02	5.95E-03
Nitrogen	1.25E-03	5.65E-04
Nickel	6.57E-03	2.96E-03
Lead	6.04E+03	2.72E+03
Palladium	1.68E+00	7.56E-01
Ruthenium	1.07E-08	4.83E-09
Sulphur	1.86E-15	8.40E-16
Samarium	2.25E-08	1.01E-08
Xenon	2.58E-11	1.16E-11
Xylene	1.80E-01	8.14E-02
Zirconium	1.00E-05	4.52E-06

Radionuclides in Table D-1 were carried forward for further analysis. However, exposure to Radon-222 from the waste pile was excluded, as it will be dispersed quickly in air, consistent with guidance from Health Canada (2010b). Also, Sm-148 and Nd-144 were excluded, based on their very low activity concentrations.

Non-radionuclides were screened against CCME Soil Quality Guidelines for human health (CCME, 2015, 2006, 2004, 1999a,b,c,d,e,f, 1997). For non-radionuclides without soil quality guidelines, background soil concentrations were taken from the Ontario Ministry of Environment and Energy 98th percentile (Ontario MOE, 2011), as well as background values reported for US soils. For HB-40, a TRV was derived based on the mammalian Lowest Observable Adverse Effect Level (LOAEL) of 250 mg/kg bw/day reported by Adamson and Weeks (1973). This was divided by 10 to estimate a No Observable Adverse Effect Level (NOAEL) and by a further factor of 100 to allow for uncertainty in animal to human extrapolation and to be protective of the public. This value was then converted to a screening benchmark for soil following the CCME soil quality guideline derivation approach (2006). HB-40 and lead are the non-radionuclides that exceed their respective screening criteria (Table D-3). Therefore, they will be carried forward for further analysis.

Table D-3: Screening of Non-radionuclides

Non-Radionuclide	Concentration (mg/kg)	CCME SGQ_{HH} (mg/kg)	OTR_{98} (mg/kg)	Dragun and Chiasson, 1991 (mg/kg)	Shacklette and Boerngen, 1984 (mg/kg)	Other	COPC?
Argon	3.94E-14	Noble gas – Not Applicable					No
Boron	3.46E-05	2					No
Barium	9.31E-06	500					No
Bismuth	9.42E-15			10			No
Cadmium	4.02E+00	14					No
Cobalt	1.36E-02	50					No
Chromium	6.78E+00	220					No
Copper	3.45E-02	1100					No
Gadolinium	1.51E-07			2.8			No
HB-40	**5.85E+03**					15	**Yes**
Helium	8.34E-05	Noble gas – Not Applicable					No
Mercury	1.37E-02	6.6					No
Potassium	1.62E-09		6500				No
Potassium hydroxide	1.83E-04		6500				No
Manganese	2.27E-03		1300				No
Molybdenum	5.95E-03	10					No
Nitrogen	5.65E-04		5700				No
Nickel	2.96E-03	200					No
Lead	**2.72E+03**	140					**Yes**
Palladium	7.56E-01				1		No
Ruthenium	4.83E-09			72			No
Sulphur	8.40E-16	500					No
Samarium	1.01E-08			4.4			No
Xenon	1.16E-11	Noble gas – Not Applicable					No
Xylene	8.14E-02	2.4					No
Zirconium	4.52E-06			159			No

2.4 Selection of Exposure Pathways

Pathways relevant to exposure from an exploratory borehole into WRDF include dermal contact, incidental ingestion, and groundshine for the driller and trespassers. In addition, for the trespassers there may be inhalation of dust from resuspension of dried waste material. This pathway is incomplete for the driller as the material will be wet while they are at site.

2.5 Exposure Factors

Equations from Health Canada (2010a) and CSA N288.1 (2014) were used to calculate incidental ingestion of soil, dermal contact with soil, inhalation of dust from soil, and groundshine exposures. Factors used to calculate these exposures are in Table D-4.

The relative absorption factor (RAF) of all COPCs was assumed to be 1 for oral and inhalation pathways, as per Health Canada guidance (2010a). For inorganic COPCs a RAF of 0.1 was used for inorganics, unless Health Canada had a specified value. For example, nickel had a dermal RAF of 0.091.

Beachshine dose coefficients from CSA N288.1 (2014) were used to represent groundshine, because they assume a 5 cm thickness of waste on the ground, which was considered appropriate for this scenario. A width factor of 0.2 was used, accounting for the finite width of the contaminated area, and a dilution factor of 1 was used because dilution was accounted for in calculating the activity concentration as described in Section 2.1.

Table D-4: Exposure Factors for Dose Calculations

Receptor Characteristic	3mo.- Infant	Infant 1y /Toddler	Child 10y	Adult (Male)	Driller (Adult)	Source
Age (years)	0-6 month	7 months to 4 years	5 to 11	20+	20+	Health Canada (HC), 1994 (as cited in HC, 2010a)
Age group duration (yr)	0.5	4.5	7	60	60	Based on 80 yr lifespan (HC, 2010a)
Body Weight (kg)	8.2	16.5	32.9	70.7	70.7	Richardson, 1997 (as cited in HC, 2010a)
Soil Ingestion Rate (kg/day)	0.00002	0.00008	0.00002	0.00002	0.00002	HC, 2010a
Inhalation Rate (m3/day)	2.2	8.3	14.5	16.6	33.6	Allan et al., 2008 2009 (as cited in HC, 2010a)
Hands SA (cm^2)	320	430	590	890	890	Richardson, 1997 (as cited in HC, 2010a)
Arms SA (cm^2)	550	890	1480	2500	2500	Richardson, 1997 (as cited in HC, 2010a)
Hands soil loading (kg/cm2/event)	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-06	Kissel et al., 1996 (as cited in HC, 2010a)
Non-hands soil loading (kg/cm2/event)	1.00E-08	1.00E-08	1.00E-08	1.00E-08	1.00E-07	Kissel et al., 1996 (as cited in HC, 2010a)
Hours per day on site /24 hours	1	1	1	1	1	Assumed
Days per week on site/7 days	1	1	1	1	1	Assumed
Weeks per year on site /52 weeks	31	31	31	31	1	Climate Normal
offshore occupancy factor	0.00354	0.00354	0.00354	0.00354	0.00011	Calculated

2.6 Doses

The radiological doses are presented in Table D-5. Non-radiological doses are presented in Table D-6.

Table D-5: Estimated Radiation Dose for Receptors near Borehole

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
Adult	Ac-225	mSv/a	6.31E-14	5.68E-13	5.12E-13	1.14E-12
	Ac-227	mSv/a	2.48E-10	8.91E-11	1.30E-09	1.64E-09
	Ag-108m	mSv/a	3.32E-09	2.48E-06	2.81E-10	2.49E-06
	Am-241	mSv/a	1.32E-04	7.06E-06	7.31E-04	8.70E-04
	Am-243	mSv/a	1.07E-07	9.67E-08	5.74E-07	7.77E-07
	Bi-210	mSv/a	7.78E-15	8.40E-15	1.46E-14	3.08E-14
	C-14	mSv/a	7.04E-05	3.85E-07	3.83E-08	7.08E-05
	Ca-41	mSv/a	7.08E-10	0.00E+00	9.31E-12	7.18E-10
	Cl-36	mSv/a	7.82E-14	4.71E-14	1.61E-14	1.41E-13
	Cm-244	mSv/a	6.92E-09	1.59E-12	4.09E-08	4.78E-08
	Co-60	mSv/a	2.92E-09	2.12E-06	2.26E-10	2.12E-06
	Cs-137	mSv/a	7.70E-06	3.34E-04	7.16E-08	3.42E-04
	Eu-152	mSv/a	6.06E-11	4.81E-08	4.77E-11	4.82E-08
	Eu-154	mSv/a	1.99E-11	1.21E-08	1.39E-11	1.21E-08
	Eu-155	mSv/a	1.15E-16	1.46E-14	6.49E-17	1.48E-14
	Fe-55	mSv/a	2.81E-17	0.00E+00	8.50E-19	2.89E-17
	Gd-152	mSv/a	8.14E-20	0.00E+00	4.18E-19	4.99E-19
	H-3	mSv/a	7.32E-07	0.00E+00	2.89E-08	7.61E-07
	I-129	mSv/a	6.13E-10	1.64E-11	1.41E-11	6.43E-10
	Nb-94	mSv/a	2.10E-04	1.93E-01	3.57E-05	1.93E-01
	Ni-59	mSv/a	2.16E-05	0.00E+00	1.17E-06	2.28E-05
	Ni-63	mSv/a	2.58E-03	0.00E+00	2.17E-04	2.79E-03
	Np-237	mSv/a	7.04E-09	1.31E-08	3.87E-08	5.89E-08
	Np-239	mSv/a	4.26E-10	7.90E-08	1.30E-11	7.94E-08
	Pa-231	mSv/a	1.67E-10	6.79E-11	8.66E-10	1.10E-09
	Pa-233	mSv/a	5.55E-11	1.21E-08	5.53E-12	1.22E-08
	Pb-210	mSv/a	4.12E-12	1.20E-14	1.73E-13	4.30E-12
	Po-210	mSv/a	7.13E-12	5.27E-17	5.16E-13	7.65E-12
	Pu-238	mSv/a	6.63E-06	9.64E-10	3.49E-05	4.15E-05
	Pu-239	mSv/a	4.60E-05	1.07E-08	2.42E-04	2.88E-04
	Pu-240	mSv/a	6.49E-05	8.47E-09	3.41E-04	4.06E-04
	Pu-241	mSv/a	8.97E-08	3.69E-08	4.42E-07	5.68E-07
	Ra-223	mSv/a	2.25E-11	6.57E-11	4.37E-11	1.32E-10
	Ra-224	mSv/a	2.02E-18	4.61E-17	2.45E-18	5.06E-17
	Ra-225	mSv/a	2.60E-13	5.75E-13	4.36E-13	1.27E-12
	Ra-226	mSv/a	1.53E-12	9.40E-12	5.02E-13	1.14E-11
	Ra-228	mSv/a	2.16E-17	7.64E-17	2.14E-18	1.00E-16
	Sr-90	mSv/a	1.29E-05	4.70E-06	4.36E-07	1.80E-05
	Tc-99	mSv/a	2.13E-09	9.46E-11	3.50E-10	2.58E-09
	Th-227	mSv/a	1.95E-12	8.81E-11	5.83E-11	1.48E-10
	Th-228	mSv/a	2.22E-18	4.61E-17	3.24E-17	8.07E-17
	Th-229	mSv/a	1.30E-12	7.67E-13	4.94E-12	7.00E-12

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
	Th-230	mSv/a	1.31E-11	1.87E-12	2.29E-11	3.79E-11
	Th-231	mSv/a	1.65E-11	1.60E-08	4.20E-13	1.60E-08
	Th-232	mSv/a	7.34E-18	7.80E-17	2.10E-17	1.06E-16
	Th-234	mSv/a	1.28E-09	9.25E-09	7.59E-11	1.06E-08
	U-233	mSv/a	3.91E-12	1.06E-13	7.25E-12	1.13E-11
	U-234	mSv/a	1.08E-09	1.97E-12	2.03E-09	3.12E-09
	U-235	mSv/a	2.28E-09	7.25E-09	3.95E-09	1.35E-08
	U-236	mSv/a	8.05E-11	8.25E-14	1.44E-10	2.25E-10
	U-237	mSv/a	3.40E-13	9.19E-11	2.23E-14	9.22E-11
	U-238	mSv/a	1.69E-08	9.25E-09	2.86E-08	5.47E-08
	Y-90	mSv/a	1.24E-06	4.62E-06	1.69E-08	5.88E-06
	Total	**mSv/a**	**3.15E-03**	**1.94E-01**	**1.60E-03**	**1.98E-01**
Child_10y	Ac-225	mSv/a	1.42E-13	5.68E-13	9.06E-15	7.19E-13
	Ac-227	mSv/a	3.38E-10	8.91E-11	1.34E-09	1.77E-09
	Ag-108m	mSv/a	6.21E-09	2.48E-06	3.65E-10	2.49E-06
	Am-241	mSv/a	1.46E-04	7.06E-06	6.08E-04	7.61E-04
	Am-243	mSv/a	1.17E-07	9.67E-08	4.89E-07	7.03E-07
	Bi-210	mSv/a	1.74E-14	8.40E-15	1.79E-14	4.36E-14
	C-14	mSv/a	9.71E-05	3.85E-07	5.01E-08	9.75E-05
	Ca-41	mSv/a	1.79E-09	0.00E+00	1.46E-11	1.80E-09
	Cl-36	mSv/a	1.60E-13	4.71E-14	1.93E-14	2.26E-13
	Cm-244	mSv/a	8.07E-09	1.59E-12	3.57E-08	4.38E-08
	Co-60	mSv/a	9.44E-09	2.12E-06	2.96E-10	2.13E-06
	Cs-137	mSv/a	5.92E-06	3.34E-04	5.03E-08	3.40E-04
	Eu-152	mSv/a	1.12E-10	4.81E-08	4.87E-11	4.83E-08
	Eu-154	mSv/a	4.08E-11	1.21E-08	1.49E-11	1.21E-08
	Eu-155	mSv/a	2.43E-16	1.46E-14	7.56E-17	1.49E-14
	Fe-55	mSv/a	9.36E-17	0.00E+00	1.21E-18	9.48E-17
	Gd-152	mSv/a	1.05E-19	0.00E+00	4.06E-19	5.11E-19
	H-3	mSv/a	9.15E-07	0.00E+00	3.15E-08	9.47E-07
	I-129	mSv/a	1.06E-09	1.64E-11	2.17E-11	1.10E-09
	Nb-94	mSv/a	4.20E-04	1.93E-01	4.54E-05	1.94E-01
	Ni-59	mSv/a	3.77E-05	0.00E+00	1.65E-06	3.94E-05
	Ni-63	mSv/a	4.81E-03	0.00E+00	2.76E-04	5.08E-03
	Np-237	mSv/a	7.04E-09	1.31E-08	3.23E-08	5.25E-08
	Np-239	mSv/a	9.05E-10	7.90E-08	1.71E-11	7.99E-08
	Pa-231	mSv/a	2.17E-10	6.79E-11	8.11E-10	1.10E-09
	Pa-233	mSv/a	1.21E-10	1.21E-08	6.88E-12	1.22E-08
	Pb-210	mSv/a	1.13E-11	1.20E-14	2.06E-13	1.16E-11
	Po-210	mSv/a	1.55E-11	5.27E-17	6.28E-13	1.61E-11
	Pu-238	mSv/a	6.92E-06	9.64E-10	2.91E-05	3.60E-05
	Pu-239	mSv/a	4.97E-05	1.07E-08	2.03E-04	2.52E-04
	Pu-240	mSv/a	7.01E-05	8.47E-09	2.86E-04	3.56E-04
	Pu-241	mSv/a	9.53E-08	3.69E-08	3.56E-07	4.88E-07
	Ra-223	mSv/a	1.01E-10	6.57E-11	5.11E-11	2.18E-10
	Ra-224	mSv/a	8.08E-18	4.61E-17	2.78E-18	5.69E-17
	Ra-225	mSv/a	1.32E-12	5.75E-13	5.07E-13	2.40E-12
	Ra-226	mSv/a	4.36E-12	9.40E-12	6.13E-13	1.44E-11
	Ra-228	mSv/a	1.22E-16	7.64E-17	3.30E-18	2.02E-16

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
	Sr-90	mSv/a	2.76E-05	4.70E-06	5.39E-07	3.29E-05
	Tc-99	mSv/a	4.33E-09	9.46E-11	4.36E-10	4.86E-09
	Th-227	mSv/a	5.10E-12	8.81E-11	7.13E-11	1.65E-10
	Th-228	mSv/a	4.62E-18	4.61E-17	3.89E-17	8.96E-17
	Th-229	mSv/a	1.64E-12	7.67E-13	5.29E-12	7.70E-12
	Th-230	mSv/a	1.49E-11	1.87E-12	2.29E-11	3.97E-11
	Th-231	mSv/a	3.58E-11	1.60E-08	5.78E-13	1.61E-08
	Th-232	mSv/a	9.26E-18	7.80E-17	1.91E-17	1.06E-16
	Th-232	mSv/a	2.78E-09	9.25E-09	9.47E-11	1.21E-08
	U-233	mSv/a	5.97E-12	1.06E-13	8.62E-12	1.47E-11
	U-234	mSv/a	1.63E-09	1.97E-12	2.43E-09	4.07E-09
	U-235	mSv/a	3.44E-09	7.25E-09	4.78E-09	1.55E-08
	U-236	mSv/a	1.20E-10	8.25E-14	1.77E-10	2.97E-10
	U-237	mSv/a	7.15E-13	9.19E-11	2.77E-14	9.26E-11
	U-238	mSv/a	2.55E-08	9.25E-09	3.45E-08	6.92E-08
	Y-90	mSv/a	2.72E-06	4.62E-06	7.08E-08	7.41E-06
	Total	**mSv/a**	**5.67E-03**	**1.94E-01**	**1.45E-03**	**2.01E-01**
Infant_1y	Ac-225	mSv/a	1.89E-12	7.38E-13	7.26E-13	3.36E-12
	Ac-227	mSv/a	2.79E-09	1.16E-10	1.63E-09	4.53E-09
	Ag-108m	mSv/a	6.36E-08	3.23E-06	5.13E-10	3.29E-06
	Am-241	mSv/a	9.80E-04	9.17E-06	6.00E-04	1.59E-03
	Am-243	mSv/a	7.88E-07	1.26E-07	4.76E-07	1.39E-06
	Bi-210	mSv/a	2.32E-13	1.09E-14	2.36E-14	2.67E-13
	C-14	mSv/a	7.77E-04	3.85E-07	6.06E-08	7.77E-04
	Ca-41	mSv/a	7.76E-09	0.00E+00	1.27E-11	7.77E-09
	Cl-36	mSv/a	2.12E-12	4.70E-14	2.87E-14	2.19E-12
	Cm-244	mSv/a	6.69E-08	2.07E-12	4.32E-08	1.10E-07
	Co-60	mSv/a	9.27E-08	2.75E-06	3.84E-10	2.84E-06
	Cs-137	mSv/a	2.84E-05	4.34E-04	4.20E-08	4.63E-04
	Eu-152	mSv/a	1.28E-09	6.26E-08	5.68E-11	6.39E-08
	Eu-154	mSv/a	4.78E-10	1.57E-08	1.96E-11	1.62E-08
	Eu-155	mSv/a	3.15E-15	1.90E-14	1.08E-16	2.22E-14
	Fe-55	mSv/a	8.17E-16	0.00E+00	1.57E-18	8.19E-16
	Gd-152	mSv/a	9.53E-19	0.00E+00	4.96E-19	1.45E-18
	H-3	mSv/a	7.76E-06	0.00E+00	3.85E-08	7.80E-06
	I-129	mSv/a	4.90E-09	2.13E-11	1.46E-11	4.94E-09
	Nb-94	mSv/a	4.79E-03	2.51E-01	6.01E-05	2.56E-01
	Ni-59	mSv/a	4.67E-04	0.00E+00	2.79E-06	4.69E-04
	Ni-63	mSv/a	5.77E-02	0.00E+00	4.29E-04	5.81E-02
	Np-237	mSv/a	5.37E-08	1.71E-08	3.36E-08	1.04E-07
	Np-239	mSv/a	1.21E-08	1.03E-07	2.94E-11	1.15E-07
	Pa-231	mSv/a	1.22E-09	8.82E-11	7.12E-10	2.02E-09
	Pa-233	mSv/a	1.58E-09	1.57E-08	9.22E-12	1.73E-08
	Pb-210	mSv/a	8.60E-11	1.56E-14	2.90E-13	8.63E-11
	Po-210	mSv/a	2.09E-10	6.85E-17	8.59E-13	2.10E-10
	Pu-238	mSv/a	4.61E-05	1.25E-09	2.80E-05	7.42E-05
	Pu-239	mSv/a	3.09E-04	1.39E-08	1.86E-04	4.95E-04
	Pu-240	mSv/a	4.36E-04	1.10E-08	2.63E-04	6.99E-04
	Pu-241	mSv/a	4.26E-07	4.80E-08	2.38E-07	7.12E-07

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
	Ra-223	mSv/a	9.89E-10	8.54E-11	6.21E-11	1.14E-09
	Ra-224	mSv/a	8.20E-17	5.99E-17	3.35E-18	1.45E-16
	Ra-225	mSv/a	1.26E-11	7.47E-13	6.22E-13	1.40E-11
	Ra-226	mSv/a	2.09E-11	1.23E-11	7.88E-13	3.40E-11
	Ra-228	mSv/a	7.13E-16	9.93E-17	4.11E-18	8.16E-16
	Sr-90	mSv/a	1.34E-04	4.70E-06	6.65E-07	1.40E-04
	Tc-99	mSv/a	6.39E-08	9.46E-11	5.69E-10	6.46E-08
	Th-227	mSv/a	6.21E-11	1.14E-10	8.74E-11	2.64E-10
	Th-228	mSv/a	4.56E-17	5.98E-17	5.27E-17	1.58E-16
	Th-229	mSv/a	1.06E-11	9.97E-13	6.61E-12	1.82E-11
	Th-230	mSv/a	1.02E-10	2.43E-12	2.86E-11	1.33E-10
	Th-231	mSv/a	4.84E-10	2.08E-08	1.08E-12	2.13E-08
	Th-232	mSv/a	5.75E-17	1.01E-16	2.10E-17	1.80E-16
	Th-234	mSv/a	3.75E-08	1.20E-08	1.53E-10	4.97E-08
	U-233	mSv/a	4.29E-11	1.38E-13	1.11E-11	5.41E-11
	U-234	mSv/a	1.15E-08	2.57E-12	3.19E-09	1.47E-08
	U-235	mSv/a	2.52E-08	9.42E-09	6.37E-09	4.10E-08
	U-236	mSv/a	8.91E-10	1.07E-13	2.25E-10	1.12E-09
	U-237	mSv/a	9.65E-12	1.19E-10	3.76E-14	1.29E-10
	U-238	mSv/a	1.80E-07	1.20E-08	4.64E-08	2.38E-07
	Y-90	mSv/a	3.68E-05	4.62E-06	9.68E-08	4.15E-05
	Total	**mSv/a**	**6.57E-02**	**2.52E-01**	**1.57E-03**	**3.19E-01**
3mo	Ac-225	mSv/a	1.21E-12	7.38E-13	2.57E-13	2.20E-12
	Ac-227	mSv/a	7.43E-09	1.16E-10	4.47E-10	7.99E-09
	Ag-108m	mSv/a	1.59E-08	3.23E-06	1.36E-10	3.25E-06
	Am-241	mSv/a	2.45E-03	9.17E-06	1.68E-04	2.63E-03
	Am-243	mSv/a	1.92E-06	1.26E-07	1.34E-07	2.18E-06
	Bi-210	mSv/a	8.98E-14	1.09E-14	8.14E-15	1.09E-13
	C-14	mSv/a	1.70E-04	3.85E-07	1.61E-08	1.70E-04
	Ca-41	mSv/a	4.47E-09	0.00E+00	5.46E-12	4.48E-09
	Cl-36	mSv/a	8.24E-13	4.70E-14	9.08E-15	8.80E-13
	Cm-244	mSv/a	1.67E-07	2.07E-12	1.25E-08	1.80E-07
	Co-60	mSv/a	4.64E-08	2.75E-06	1.26E-10	2.80E-06
	Cs-137	mSv/a	1.24E-05	4.34E-04	1.82E-08	4.47E-04
	Eu-152	mSv/a	6.92E-10	6.26E-08	1.66E-11	6.33E-08
	Eu-154	mSv/a	2.49E-10	1.57E-08	5.55E-12	1.59E-08
	Eu-155	mSv/a	1.54E-15	1.90E-14	3.24E-17	2.05E-14
	Fe-55	mSv/a	6.47E-16	0.00E+00	5.63E-19	6.47E-16
	Gd-152	mSv/a	2.38E-18	0.00E+00	1.45E-19	2.53E-18
	H-3	mSv/a	2.56E-06	0.00E+00	1.34E-08	2.58E-06
	I-129	mSv/a	1.00E-09	2.13E-11	3.30E-12	1.03E-09
	Nb-94	mSv/a	1.85E-03	2.51E-01	1.85E-05	2.53E-01
	Ni-59	mSv/a	2.20E-04	0.00E+00	9.44E-07	2.20E-04
	Ni-63	mSv/a	2.75E-02	0.00E+00	1.49E-04	2.76E-02
	Np-237	mSv/a	1.28E-07	1.71E-08	9.80E-09	1.55E-07
	Np-239	mSv/a	4.74E-09	1.03E-07	1.09E-11	1.07E-07
	Pa-231	mSv/a	3.30E-09	8.82E-11	1.80E-10	3.56E-09
	Pa-233	mSv/a	6.19E-10	1.57E-08	3.33E-12	1.64E-08
	Pb-210	mSv/a	5.01E-11	1.56E-14	1.04E-13	5.03E-11

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
	Po-210	mSv/a	1.55E-10	6.85E-17	3.11E-13	1.55E-10
	Pu-238	mSv/a	1.15E-04	1.25E-09	7.83E-06	1.23E-04
	Pu-239	mSv/a	7.72E-04	1.39E-08	5.12E-05	8.24E-04
	Pu-240	mSv/a	1.09E-03	1.10E-08	7.23E-05	1.16E-03
	Pu-241	mSv/a	1.05E-06	4.80E-08	5.92E-08	1.15E-06
	Ra-223	mSv/a	1.19E-09	8.54E-11	2.19E-11	1.30E-09
	Ra-224	mSv/a	8.39E-17	5.99E-17	1.19E-18	1.45E-16
	Ra-225	mSv/a	1.87E-11	7.47E-13	2.20E-13	1.96E-11
	Ra-226	mSv/a	2.56E-11	1.23E-11	2.85E-13	3.82E-11
	Ra-228	mSv/a	9.48E-16	9.93E-17	1.63E-18	1.05E-15
	Sr-90	mSv/a	1.06E-04	4.70E-06	2.40E-07	1.11E-04
	Tc-99	mSv/a	3.33E-08	9.46E-11	1.97E-10	3.36E-08
	Th-227	mSv/a	6.65E-11	1.14E-10	3.01E-11	2.11E-10
	Th-228	mSv/a	1.14E-16	5.98E-17	1.72E-17	1.91E-16
	Th-229	mSv/a	2.91E-11	9.97E-13	1.94E-12	3.20E-11
	Th-230	mSv/a	2.55E-10	2.43E-12	8.68E-12	2.66E-10
	Th-231	mSv/a	1.89E-10	2.08E-08	4.05E-13	2.10E-08
	Th-232	mSv/a	1.47E-16	1.01E-16	6.01E-18	2.54E-16
	Th-234	mSv/a	1.50E-08	1.20E-08	5.36E-11	2.71E-08
	U-233	mSv/a	2.91E-11	1.38E-13	4.00E-12	3.32E-11
	U-234	mSv/a	8.17E-09	2.57E-12	1.15E-09	9.33E-09
	U-235	mSv/a	1.70E-08	9.42E-09	2.19E-09	2.86E-08
	U-236	mSv/a	5.99E-10	1.07E-13	8.35E-11	6.83E-10
	U-237	mSv/a	3.71E-12	1.19E-10	1.35E-14	1.23E-10
	U-238	mSv/a	1.28E-07	1.20E-08	1.57E-08	1.55E-07
	Y-90	mSv/a	1.43E-05	4.62E-06	2.08E-08	1.89E-05
	Total	**mSv/a**	**3.43E-02**	**2.52E-01**	**4.69E-04**	**2.86E-01**
Driller	Ac-225	mSv/a	2.04E-15	1.83E-14	NA	2.04E-14
	Ac-227	mSv/a	7.99E-12	2.87E-12	NA	1.09E-11
	Ag-108m	mSv/a	1.07E-10	8.01E-08	NA	8.02E-08
	Am-241	mSv/a	4.27E-06	2.28E-07	NA	4.50E-06
	Am-243	mSv/a	3.44E-09	3.12E-09	NA	6.55E-09
	Bi-210	mSv/a	2.51E-16	2.71E-16	NA	5.22E-16
	C-14	mSv/a	2.27E-06	1.24E-08	NA	2.28E-06
	Ca-41	mSv/a	2.29E-11	0.00E+00	NA	2.29E-11
	Cl-36	mSv/a	2.52E-15	1.52E-15	NA	4.04E-15
	Cm-244	mSv/a	2.23E-10	5.14E-14	NA	2.23E-10
	Co-60	mSv/a	9.41E-11	6.83E-08	NA	6.84E-08
	Cs-137	mSv/a	2.48E-07	1.08E-05	NA	1.10E-05
	Eu-152	mSv/a	1.95E-12	1.55E-09	NA	1.55E-09
	Eu-154	mSv/a	6.43E-13	3.89E-10	NA	3.89E-10
	Eu-155	mSv/a	3.70E-18	4.71E-16	NA	4.74E-16
	Fe-55	mSv/a	9.06E-19	0.00E+00	NA	9.06E-19
	Gd-152	mSv/a	2.63E-21	0.00E+00	NA	2.63E-21
	H-3	mSv/a	2.36E-08	0.00E+00	NA	2.36E-08
	I-129	mSv/a	1.98E-11	5.29E-13	NA	2.03E-11
	Nb-94	mSv/a	6.78E-06	6.23E-03	NA	6.24E-03
	Ni-59	mSv/a	6.97E-07	0.00E+00	NA	6.97E-07

Human Type	Radionuclide	Unit	Soil Ingestion	Groundshine	Dust Inhalation	Total
	Ni-63	mSv/a	8.31E-05	0.00E+00	NA	8.31E-05
	Np-237	mSv/a	2.27E-10	4.24E-10	NA	6.51E-10
	Np-239	mSv/a	1.37E-11	2.55E-09	NA	2.56E-09
	Pa-231	mSv/a	5.39E-12	2.19E-12	NA	7.58E-12
	Pa-233	mSv/a	1.79E-12	3.90E-10	NA	3.92E-10
	Pb-210	mSv/a	1.33E-13	3.88E-16	NA	1.33E-13
	Po-210	mSv/a	2.30E-13	1.70E-18	NA	2.30E-13
	Pu-238	mSv/a	2.14E-07	3.11E-11	NA	2.14E-07
	Pu-239	mSv/a	1.48E-06	3.45E-10	NA	1.48E-06
	Pu-240	mSv/a	2.09E-06	2.73E-10	NA	2.09E-06
	Pu-241	mSv/a	2.89E-09	1.19E-09	NA	4.08E-09
	Ra-223	mSv/a	7.25E-13	2.12E-12	NA	2.84E-12
	Ra-224	mSv/a	6.51E-20	1.49E-18	NA	1.55E-18
	Ra-225	mSv/a	8.40E-15	1.85E-14	NA	2.69E-14
	Ra-226	mSv/a	4.92E-14	3.03E-13	NA	3.52E-13
	Ra-228	mSv/a	6.96E-19	2.46E-18	NA	3.16E-18
	Sr-90	mSv/a	4.16E-07	1.52E-07	NA	5.67E-07
	Tc-99	mSv/a	6.87E-11	3.05E-12	NA	7.18E-11
	Th-227	mSv/a	6.30E-14	2.84E-12	NA	2.91E-12
	Th-228	mSv/a	7.16E-20	1.49E-18	NA	1.56E-18
	Th-229	mSv/a	4.18E-14	2.48E-14	NA	6.66E-14
	Th-230	mSv/a	4.22E-13	6.02E-14	NA	4.82E-13
	Th-231	mSv/a	5.31E-13	5.17E-10	NA	5.17E-10
	Th-232	mSv/a	2.37E-19	2.52E-18	NA	2.75E-18
	Th-234	mSv/a	4.11E-11	2.98E-10	NA	3.40E-10
	U-233	mSv/a	1.26E-13	3.41E-15	NA	1.29E-13
	U-234	mSv/a	3.49E-11	6.37E-14	NA	3.50E-11
	U-235	mSv/a	7.35E-11	2.34E-10	NA	3.07E-10
	U-236	mSv/a	2.60E-12	2.66E-15	NA	2.60E-12
	U-237	mSv/a	1.10E-14	2.96E-12	NA	2.97E-12
	U-238	mSv/a	5.45E-10	2.98E-10	NA	8.43E-10
	Y-90	mSv/a	4.01E-08	1.49E-07	NA	1.89E-07
	Total	**mSv/a**	**1.02E-04**	**6.24E-03**	**NA**	**6.35E-03**

Table D-6: Estimated Non-Radiological Dose for Receptors near Borehole

Human Type	Non-radionuclide	Unit	Dose by Pathway			Total
			Soil Ingestion	Soil Dermal Contact	Dust Inhalation	
Adult	HB-40	mg/kg bw/day	8.80E-01	1.14E-01	2.89E-02	1.02E+00
	Lead	mg/kg bw/day	4.09E-01	2.65E-02	1.34E-02	4.49E-01
Toddler	HB-40	mg/kg bw/day	5.13E-02	5.85E-02	1.35E-02	1.23E-01
	Lead	mg/kg bw/day	2.39E-02	1.36E-02	6.28E-03	4.38E-02
Driller	HB-40	mg/kg bw/day	1.66E-03	1.89E-02	NA	2.05E-02
	Lead	mg/kg bw/day	7.70E-04	4.39E-03	NA	5.16E-03

2.7 Toxicity Reference Values

For HB-40, a TRV was derived based on the mammalian Lowest Observable Adverse Effect Level (LOAEL) of 250 mg/kg bw/day reported by Adamson and Weeks (1973). This was divided by 10 to estimate a No Observable Adverse Effect Level (NOAEL) and by a further factor of 100 to allow for uncertainty in animal to human extrapolation and to be protective of the public.

The TRV for lead from Health Canada is currently under review. The selected TRV for lead is from the Ontario Ministry of the Environment and Energy (1994) and is an oral intake of concern (IOC) value of 0.00185 mg/kg-day. Child IQ tests have been used to measure the adverse effect of lead on neurological development. Neurological development in children is affected by blood lead levels. The OMOE (1994) noted a statistically significant adverse effect at a blood lead level of 10 µg/dL, corresponding to lead exposure at 3.7 µg/kg body weight/day. The OMOE used half this level (1.85 µg/kg body weight/day) as a threshold for adverse effects on neurological development.

2.8 Radiation Dose Limits and Targets

For disruptive events, a reference level ranging from 1 mSv/a to 20 mSv/a has been defined (IAEA 2011).

2.9 Risk Estimates

2.9.1 Radionuclides

For radionuclides, the total doses are compared to the IAEA reference level ranging from 1 to 20 mSv/a. A summary of the total dose for each receptor and age group is provided in Table D-7 along with a comparison to the IAEA reference level.

Total doses for all receptors are below the IAEA reference level (lower and upper level). The highest dose is to the trespasser (infant), and the main contributor to total dose is niobium-94, and groundshine is the dominant pathway.

Table D-7: Summary of Total Dose for Human Receptors and Comparison to Limits

Age Group	Dose (mSv/a)
Trespasser – Adult	1.98E-01
Trespasser – Child	2.01E-01
Trespasser – Infant	3.19E-01
Trespasser – 3 Month	2.86E-01
Driller	6.35E-03

Notes:
Bold cells indicate exceedance of the lower IAEA reference level of 1 mSv/a and shaded cells indicate exceedance of the upper IAEA reference level of 20 mSv/a.

2.9.2 Non-Radionuclides

In order to characterize potential risks due to chemical COPCs quantitatively, the results of the exposure and toxicity assessments were used to estimate HQs for each receptor. HQs were estimated for non-carcinogenic substances using a threshold TRV as follows:

Hazard Quotient = Estimated Exposure / Toxicity Reference Value

These HQs were compared to a target value of 0.2 per medium, as recommended by Clause 6.5.2.6 in CSA N288.6-12 (see Table D-8).

The HQ for HB-40 exceeded the target value for the adult and toddler for soil ingestion and soil dermal contact, but not for dust inhalation.

Table D-8: Hazard Quotients for Receptors near Borehole

Human Type	Non-radionuclide	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Total
Adult	HB-40	**3.52E+00**	**4.57E-01**	1.16E-01	**4.09E+00**
	Lead	**3.41E+02**	**2.21E+01**	**1.12E+01**	**3.74E+02**
Toddler	HB-40	**2.05E-01**	**2.34E-01**	5.40E-02	**4.93E-01**
	Lead	**1.99E+01**	**1.13E+01**	**5.23E+00**	**3.65E+01**
Driller	HB-40	6.62E-03	7.55E-02	NA	8.21E-02
	Lead	**6.42E-01**	**3.66E+00**	NA	**4.30E+00**

Notes:
Bold and shaded values indicate HQ greater than 0.2.

2.10 Summary

Dose from radionuclides did not exceed the lower end of the IAEA reference level for any of the human receptors evaluated in the human intrusion scenario.

For non-radionuclides, risk could not be ruled out for the human intrusion scenario. The HQ exceeded the target level for HB-40 and lead for the toddler and adult. For the driller the HQ exceeded the target level for lead only. The pathways with the highest HQs typically include incidental soil ingestion and dermal contact. As indicated in Section 2.7, the TRVs for HB-40 and lead incorporate safety factors to account for uncertainty, making the results conservative. Additionally, the human intrusion scenario is a very unlikely scenario based on worst-case assumptions, since it is unlikely someone would drill down to bedrock in the WRDF without realizing they were drilling through a facility.

3.0 Well in Plume

This disruptive scenario differs from the normal evolution scenario, in that a half-distance bedrock pathway is modelled to evaluate a groundwater well located half way between WR-1 and the Winnipeg River. It is assumed that the on-site farmer has a well in the groundwater plume from WRDF and uses it for drinking water. Water for other purposes, including bathing and irrigation of garden crops is taken from the Winnipeg River near the site. The farmer cannot use the well for purposes other than drinking because the well capacity is too low. An overburden well (0.0508 m radius) would encounter primarily basal sand that has a hydraulic conductivity of 1.7E-8 m/s, with a maximum of 2.5E-7 m/s. Considering average properties of this aquifer property, the well capacity is estimated to be 0.02 m^3/d (or 20 L per day). This is adequate for use as drinking water but not for all water needs of the farmer receptor. A typical Canadian household uses approximately 0.3 m^3/day for all purposes. Therefore, all other water uses are still from the Winnipeg River directly adjacent to the site.

The on-site farmer in the normal evolution scenario receives drinking water from the Winnipeg River. In this disruptive scenario the same farmer receives drinking water instead from a groundwater well in the groundwater plume from the WRDF.

3.1 Selection of Radionuclides and Non-Radionuclides

It was determined that this scenario was not feasible until after the 100-year institutional control period ended. During institutional control long-term performance monitoring and maintenance activities will occur to demonstrate compliance with the safety case assumptions; therefore, the scenario is based on mass loadings after 100 years of institutional control. Maximum mass loadings from the half-distance bedrock pathway groundwater model (Scenario 16 in the sensitivy cases evaluated in the Groundwater Flow and Solute Transport Modelling Report (Golder, 2021) were converted to activity loadings based on the methodology outlined in Section 3.2.1 in the main ERA report. Maximum mass loadings for each radionuclide and non-radionuclide were then converted to groundwater concentrations using the anticipated groundwater flowrate (Table 5-1 in the main ERA report) through the bedrock pathway for the time period of maximum mass loadings. The concentrations of radionuclides in groundwater are shown in Table D-9. All radionuclides identified in Table D-9 were assessed quantitatively for radiological dose based on the assumptions presented in Section 5.2 of the main ERA report using IMPACT™.

Groundwater concentrations for non-radionuclides are presented in Table D-10. Non-radionuclides were selected based on the human health screening criteria provided in Table 5-2 of the main ERA report. The non-radionuclides that exceed human health screening criteria are cadmium and lead.

Table D-9: Concentrations of Radionuclides in Groundwater Well

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Release Rate (Bq/d)	Groundwater Concentration (Bq/L)
Ac-225	1.75E-17	52,200	1.03E-04	5.41E-07
Ac-227	2.13E-14	93,200	1.56E-04	8.23E-07
Ag-108m	3.95E-11	2,429	3.03E-02	1.68E-04
Bi-210	2.04E-14	120,400	2.57E-01	1.35E-03
C-14	5.59E-04	951	2.53E+05	1.48E+03
Ca-41	3.32E-06	10,500	2.88E+01	1.52E-01
Cl-36	1.36E-08	107	4.57E-02	2.69E-04
Gd-152	1.88E-07	140	4.16E-10	2.44E-12
H-3	4.69E-05	101	4.58E+07	2.69E+05
I-129	1.70E-04	106	3.05E+00	1.79E-02
Nb-94	2.88E-15	444,700	5.47E-08	2.88E-10
Ni-59	6.43E-04	307,400	3.92E+03	2.06E+01
Np-237	1.04E-05	21,100	7.41E-01	3.90E-03
Pa-231	3.26E-11	93,400	1.56E-04	8.23E-07
Pa-233	4.68E-16	21,200	9.86E-04	5.19E-06
Pb-210	8.29E-13	121,200	6.42E-03	3.38E-05
Po-210	1.46E-10	119,200	6.68E+01	3.51E-01
Pu-239	2.63E-06	65,600	1.65E+01	8.71E-02
Pu-240	1.74E-08	44,100	4.01E-01	2.11E-03
Ra-223	5.09E-16	93,200	2.64E-03	1.39E-05
Ra-224	6.68E-22	310,200	1.09E-08	5.72E-11
Ra-225	2.23E-16	52,000	8.81E-04	4.64E-06
Ra-226	1.47E-11	121,300	1.47E-03	7.75E-06
Ra-228	3.91E-19	304,800	1.09E-08	5.73E-11
Rn-222	4.3E-12	121,800	6.70E+01	3.53E-01
Sm-148	1.27E-23	14,822,000	4.45E-28	2.34E-30
Tc-99	3.23E-05	5,419	5.61E+01	2.95E-01
Th-227	9.26E-17	93,400	2.89E-04	1.52E-06
Th-228	2.84E-20	354,400	2.36E-09	1.24E-11
Th-229	8.94E-12	52,300	1.94E-04	1.02E-06
Th-230	1.54E-10	117,600	3.23E-04	1.70E-06
Th-231	9.07E-18	59,900	4.89E-04	2.57E-06
Th-232	2.12E-10	297,900	2.35E-09	1.24E-11
Th-234	1.47E-15	58,500	3.45E-03	1.82E-05
U-233	3.09E-08	40,700	3.02E-02	1.59E-04
U-234	1.77E-07	65,000	1.12E-01	5.89E-04
U-235	3.13E-04	59,900	6.86E-02	3.61E-04
U-236	1.43E-05	61,700	9.38E-02	4.93E-04
U-238	1.42E-02	58,400	4.84E-01	2.55E-03

Table D-10: Human Health Screening of Non-Radionuclides in Groundwater Well

Non-radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Groundwater Concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	CDWS MAC (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Argon	5.81E-12	162	9.37E-11	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Boron	3.63E-04	2,260	5.52E-03	1.00E+01	5000	-	1500	200	1200	-	CDWS MAC	No
Barium	3.65E-08	5,382,000	5.26E-07	1.10E+01	1000	-	-	-	-	0.4	CDWS MAC	No
Bismuth	5.51E-09	46,400	7.95E-08	<2.00E-01	-	-	-	-	-	0.25	LC_{50}/100 – Borgmann *et al.* 2005	No
Cadmium	7.42E-01	102,000	**1.07E+01**	1.00E-02	5	0.137	0.08	0.1	0.114	-	CDWS MAC	**Yes**
Cobalt	2.49E-02	74,700	3.59E-01	2.00E-01	-	-	-	0.9	4	-	PWQO Ontario	No
Chromium	8.01E-03	15,276,000	1.16E-01	1.70E+00	50	37.1	1.0 (VI)	1 (VI)	-	-	CDWS MAC	No
Copper	1.02E-03	444,600	1.47E-02	1.40E+01	-	4.3	2	5	2	-	CCME WQG	No
Gadolinium	7.09E-06	143	1.14E-04	-	-	-	-	-	-	1.5	LC_{50}/100 – Borgmann *et al.* 2005	No
HB-40	4.05E+01	10,200	5.84E+02	0.00E+00	8800^	-	-	-	-	-	See Note^	No
Helium	1.29E-02	101	2.07E-01	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Mercury	8.32E-05	3,282,000	1.20E-03	1.00E-02	1	1	0.026	0.2		-	CCME WQG	No
Potassium	3.39E-07	6,872	4.89E-06	9.07E+02	-	-	-	-	-	5300	LCV/10 – Suter and Tsao 1996	No
Potassium hydroxide (as K)	5.76E-02	101	6.50E-01	-	-	-	-	-	-	5300	LCV/10 – Suter and Tsao 1996	No
Manganese	1.62E-04	190,900	2.34E-03	1.10E+01	None - naturally occurring	-	-	-	794.2	110	WQG BC	No
Molybdenum	1.17E-02	17,900	1.69E-01	2.00E-01	-	-	73	40	1000	-	CCME WQG	No
Nitrogen	5.44E-04	17,900	7.84E-03	-	1000	-	-	-	3000	-	CDWS MAC	No
Nickel	8.99E-05	430,900	1.30E-03	1.78E+00	-	25.5	25	25	-	-	CCME WQG	No
Lead	5.05E+00	2,796,000	**7.28E+01**	2.60E+00	10	0.99	1	3	4.4		CDWS MAC	**Yes**
Palladium	2.10E-01	61,600	3.02E+00	-	-	-	-	-	-	5.7	LC_{50}/100 – Borgmann *et al.* 2005	No
Ruthenium	6.27E-09	232,600	9.04E-08	-	-	-	-	-	-	10	LC_{50}/100 – Borgmann *et al.* 2005	No
Sulphur (as SO_4)	1.45E-12	120	7.01E-11	-	-	-	-	-	218000	-	WQG BC	No
Samarium	1.21E-11	15,180,000	1.74E-10	-	-	-	-	-	-	0.74	LC50/100 – Borgmann et al. 2005	No
Xenon	1.15E-09	116	1.86E-08	-	-	-	-	-	-	-	Noble Gas – not applicable	NA
Xylene	4.81E+00	132	7.75E+01	-	90	-	-	2/40/30 (m/o/p)	30	-	CDWS MAC	No
Zirconium	3.43E-09	24,398,000	4.95E-08	-	-	-	-	4	-	-	PWQO Ontario	No

Notes:
*Noble gases were assumed to volatilize rapidly.
^Derived drinking water limit based on a minimal effect level in mice of 250 mg/kg-day (Weeks 1974), divided by 1000, times 70 kg body weight, over 2 L/day of drinking water.
Background water quality was obtained from Section 6.4.2, Table 6.4.2-5 of the EIS
CDWS = Canadian Drinking Water Standard (HC 2017)
WQSOG = Manitoba Water Quality Standards, Objectives and Guidelines (MWS 2011)
CCME WQG = Canadian Council of Ministers of the Environment Water Quality Guideline (CCME 1999)
PWQO = Ontario Provincial Water Quality Objective (MOEE 1994)
WQG BC = Water Quality Guideline British Columbia (BC MOE 2017)

3.2 Doses

The dose from radionuclides for the on-site farmer residents who drink groundwater is given in Table D-11 and Table D-12. For non-radionuclides the dose is presented in Table D-13. The total dose for radionuclides is presented in Table D-14.

Table D-11: Estimated Radiation Dose for On-site Farm Resident with a Groundwater Well during Post-Closure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	4.93E-09	1.47E-17	2.59E-22	1.13E-17	3.00E-18	5.25E-16	0.00E+00	3.03E-16	5.02E-17	6.25E-17	4.93E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.44E-07	3.09E-19	6.29E-18	9.11E-15	1.42E-16	9.96E-16	0.00E+00	1.43E-14	8.71E-15	6.23E-15	3.44E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.47E-07	6.92E-16	1.16E-19	3.37E-13	9.81E-17	1.43E-12	0.00E+00	1.30E-15	8.71E-16	1.75E-15	1.47E-07
	Bi-210	mSv/a	0.00E+00	0.00E+00	6.67E-07	5.70E-16	2.03E-20	1.26E-15	1.38E-15	2.89E-14	0.00E+00	1.16E-13	4.54E-16	1.26E-14	6.67E-07
	C-14	mSv/a	7.49E-12	8.61E-15	3.27E-01	4.79E-12	2.71E-14	1.36E-12	5.35E-12	2.85E-12	0.00E+00	6.97E-06	2.87E-06	3.64E-05	3.27E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.09E-05	0.00E+00	1.76E-16	0.00E+00	3.57E-16	0.00E+00	0.00E+00	4.30E-14	5.75E-12	2.49E-12	1.09E-05
	Cl-36	mSv/a	0.00E+00	0.00E+00	9.49E-08	4.99E-17	5.68E-19	1.57E-14	5.28E-19	3.10E-17	0.00E+00	1.42E-14	1.40E-12	6.20E-12	9.49E-08
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-07	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.80E-14	0.00E+00	1.44E-24	0.00E+00	1.13E-23	0.00E+00	0.00E+00	3.91E-21	2.06E-21	2.77E-21	3.80E-14
	HTO	mSv/a	9.76E-08	0.00E+00	2.04E+00	6.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-09	4.65E-07	8.75E-07	2.04E+00
	I-129	mSv/a	1.02E-13	9.50E-19	7.49E-04	1.12E-14	5.61E-15	4.10E-12	9.19E-13	4.79E-13	0.00E+00	1.43E-11	2.68E-11	6.92E-10	7.49E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.86E-13	1.26E-25	2.01E-29	7.27E-23	2.60E-28	4.65E-24	0.00E+00	5.24E-25	2.87E-26	2.25E-28	1.86E-13
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.93E-04	0.00E+00	2.00E-15	0.00E+00	2.16E-14	0.00E+00	0.00E+00	3.71E-12	3.87E-11	2.47E-11	4.93E-04
	Np-237	mSv/a	0.00E+00	0.00E+00	1.63E-04	6.00E-15	2.57E-15	2.04E-11	2.98E-16	1.08E-14	0.00E+00	1.02E-11	3.08E-12	6.56E-13	1.63E-04
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-09	7.73E-08	1.05E-07	1.86E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.22E-07	2.59E-18	7.12E-18	1.32E-14	2.92E-16	2.30E-15	0.00E+00	6.18E-15	1.19E-14	2.56E-16	2.22E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.71E-09	6.08E-17	1.24E-22	1.11E-16	1.69E-18	7.19E-15	0.00E+00	3.59E-17	1.60E-17	9.19E-19	1.71E-09
	Pb-210	mSv/a	0.00E+00	0.00E+00	8.85E-06	6.78E-18	2.75E-16	6.13E-14	4.74E-15	2.69E-16	0.00E+00	1.25E-10	6.13E-12	9.20E-12	8.85E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	1.60E-01	4.48E-16	1.34E-13	3.81E-15	8.59E-14	1.24E-17	0.00E+00	1.13E-07	4.98E-08	1.15E-07	1.60E-01
	Pu-239	mSv/a	0.00E+00	0.00E+00	8.26E-03	7.80E-17	3.59E-14	1.68E-13	6.63E-11	3.01E-13	0.00E+00	6.64E-08	2.45E-12	1.34E-12	8.26E-03
	Pu-240	mSv/a	0.00E+00	0.00E+00	2.00E-04	1.93E-19	8.67E-17	8.61E-16	1.60E-13	4.08E-16	0.00E+00	1.61E-10	5.93E-15	3.25E-15	2.00E-04
	Ra-223	mSv/a	0.00E+00	0.00E+00	5.28E-07	3.47E-16	2.15E-20	2.51E-16	9.49E-16	5.40E-14	0.00E+00	5.87E-15	4.01E-14	2.03E-14	5.28E-07
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.41E-12	8.18E-21	2.79E-26	2.55E-21	3.84E-21	1.70E-18	0.00E+00	2.37E-20	6.50E-20	4.53E-20	1.41E-12
	Ra-225	mSv/a	0.00E+00	0.00E+00	1.74E-07	1.12E-17	1.36E-20	1.50E-16	4.61E-16	1.98E-14	0.00E+00	2.85E-15	2.32E-14	1.10E-14	1.74E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	8.24E-07	3.20E-16	4.49E-17	1.12E-12	2.52E-15	3.02E-13	0.00E+00	1.56E-14	4.20E-13	1.33E-13	8.24E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.50E-11	6.53E-21	1.61E-22	2.30E-18	4.08E-20	2.81E-18	0.00E+00	2.52E-19	5.08E-18	1.68E-18	1.50E-11
	Tc-99	mSv/a	0.00E+00	0.00E+00	7.17E-05	5.77E-15	1.09E-17	2.52E-15	6.54E-17	2.83E-16	0.00E+00	2.99E-12	1.21E-11	1.23E-11	7.17E-05
	Th-227	mSv/a	0.00E+00	0.00E+00	5.08E-09	1.58E-17	3.39E-22	6.14E-17	2.35E-16	2.06E-13	0.00E+00	8.48E-17	5.26E-18	3.45E-17	5.08E-09
	Th-228	mSv/a	0.00E+00	0.00E+00	3.40E-13	2.07E-22	1.26E-24	1.04E-19	2.37E-20	9.60E-18	0.00E+00	8.57E-21	1.14E-21	5.16E-21	3.40E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	1.90E-07	9.35E-18	8.96E-18	2.60E-14	1.29E-14	1.48E-13	0.00E+00	4.66E-15	1.38E-15	3.13E-15	1.90E-07
	Th-230	mSv/a	0.00E+00	0.00E+00	1.35E-07	7.98E-20	7.39E-18	4.36E-15	1.06E-14	2.95E-14	0.00E+00	3.83E-15	1.13E-15	2.58E-15	1.35E-07
	Th-231	mSv/a	0.00E+00	0.00E+00	3.32E-10	1.05E-18	9.74E-25	3.98E-18	1.18E-17	2.24E-13	0.00E+00	4.28E-18	2.48E-20	4.41E-19	3.32E-10
	Th-232	mSv/a	0.00E+00	0.00E+00	1.08E-12	5.87E-25	5.26E-23	2.25E-18	7.55E-20	1.56E-17	0.00E+00	2.73E-20	8.06E-21	1.83E-20	1.08E-12
	Th-234	mSv/a	0.00E+00	0.00E+00	2.34E-08	3.01E-17	1.52E-21	2.14E-16	8.19E-16	1.16E-13	0.00E+00	2.96E-16	2.09E-17	1.30E-16	2.34E-08
	U-233	mSv/a	0.00E+00	0.00E+00	3.08E-06	5.69E-18	1.24E-16	1.92E-14	5.11E-17	2.69E-17	0.00E+00	1.12E-14	1.20E-13	1.63E-12	3.08E-06
	U-234	mSv/a	0.00E+00	0.00E+00	1.09E-05	7.92E-18	3.75E-16	1.85E-14	1.55E-16	5.49E-18	0.00E+00	3.39E-14	3.62E-13	4.94E-12	1.09E-05
	U-235	mSv/a	0.00E+00	0.00E+00	6.44E-06	3.32E-15	1.47E-16	2.00E-12	6.04E-17	3.74E-15	0.00E+00	1.33E-14	1.41E-13	1.93E-12	6.44E-06
	U-236	mSv/a	0.00E+00	0.00E+00	8.80E-06	2.78E-18	1.98E-16	8.75E-15	8.15E-17	1.63E-18	0.00E+00	1.79E-14	1.91E-13	2.60E-12	8.80E-06
	U-238	mSv/a	0.00E+00	0.00E+00	4.35E-05	1.28E-16	9.72E-16	1.04E-11	4.00E-16	4.27E-15	0.00E+00	8.79E-14	9.36E-13	1.28E-11	4.35E-05
	Total	**mSv/a**	**9.76E-08**	**8.61E-15**	**2.54E+00**	**6.50E-08**	**2.09E-13**	**4.00E-11**	**7.55E-07**	**3.19E-03**	**0.00E+00**	**7.16E-06**	**3.46E-06**	**3.75E-05**	**2.54E+00**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	4.42E-09	1.47E-17	8.01E-21	1.13E-17	9.28E-17	5.25E-16	0.00E+00	4.78E-16	7.36E-17	1.07E-16	4.42E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.87E-07	3.09E-19	1.18E-16	9.11E-15	2.67E-15	9.96E-16	0.00E+00	1.37E-14	7.74E-15	6.39E-15	1.87E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.09E-07	6.92E-16	2.98E-18	3.37E-13	2.52E-15	1.43E-12	0.00E+00	1.71E-15	1.06E-15	4.84E-15	1.09E-07
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.92E-07	5.70E-16	6.21E-19	1.26E-15	4.22E-14	2.89E-14	0.00E+00	1.82E-13	6.59E-16	1.62E-14	5.92E-07
	C-14	mSv/a	1.07E-11	8.61E-15	1.80E-01	4.79E-12	5.14E-13	1.36E-12	1.01E-10	2.85E-12	0.00E+00	6.76E-06	2.58E-06	4.32E-05	1.80E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.10E-05	0.00E+00	6.11E-15	0.00E+00	1.24E-14	0.00E+00	0.00E+00	7.62E-14	9.43E-12	9.04E-12	1.10E-05

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Cl-36	mSv/a	0.00E+00	0.00E+00	7.72E-08	4.99E-17	1.60E-17	1.57E-14	1.48E-17	3.10E-17	0.00E+00	2.04E-14	1.86E-12	1.81E-11	7.72E-08
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-06	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.96E-14	0.00E+00	2.56E-23	0.00E+00	2.00E-22	0.00E+00	0.00E+00	3.55E-21	1.73E-21	1.98E-21	1.96E-14
	HTO	mSv/a	1.16E-07	0.00E+00	1.02E+00	5.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-09	3.78E-07	1.49E-06	1.02E+00
	I-129	mSv/a	1.72E-13	9.50E-19	5.15E-04	1.12E-14	1.33E-13	4.10E-12	2.18E-11	4.79E-13	0.00E+00	1.74E-11	3.01E-11	1.57E-09	5.15E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.48E-13	1.26E-25	5.53E-28	7.27E-23	7.14E-27	4.65E-24	0.00E+00	7.37E-25	3.74E-26	2.95E-28	1.48E-13
	Ni-59	mSv/a	0.00E+00	0.00E+00	3.43E-04	0.00E+00	4.81E-14	0.00E+00	5.20E-13	0.00E+00	0.00E+00	4.55E-12	4.38E-11	4.21E-11	3.43E-04
	Np-237	mSv/a	0.00E+00	0.00E+00	6.48E-05	6.00E-15	3.53E-14	2.04E-11	4.09E-15	1.08E-14	0.00E+00	7.17E-12	2.01E-12	2.80E-13	6.48E-05
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-09	6.86E-08	1.26E-07	1.98E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.14E-07	2.59E-18	1.27E-16	1.32E-14	5.20E-15	2.30E-15	0.00E+00	5.62E-15	1.00E-14	3.52E-16	1.14E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.49E-09	6.08E-17	3.73E-21	1.11E-16	5.09E-17	7.19E-15	0.00E+00	5.50E-17	2.28E-17	2.10E-18	1.49E-09
	Pb-210	mSv/a	0.00E+00	0.00E+00	9.70E-06	6.78E-18	1.04E-14	6.13E-14	1.80E-13	2.69E-16	0.00E+00	2.42E-10	1.10E-11	1.88E-11	9.70E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	1.38E-01	4.48E-16	3.99E-12	3.81E-15	2.56E-12	1.24E-17	0.00E+00	1.73E-07	7.04E-08	1.26E-07	1.38E-01
	Pu-239	mSv/a	0.00E+00	0.00E+00	3.55E-03	7.80E-17	5.33E-13	1.68E-13	9.85E-10	3.01E-13	0.00E+00	5.03E-08	1.73E-12	2.26E-12	3.55E-03
	Pu-240	mSv/a	0.00E+00	0.00E+00	8.60E-05	1.93E-19	1.29E-15	8.61E-16	2.38E-12	4.08E-16	0.00E+00	1.22E-10	4.18E-15	5.48E-15	8.60E-05
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.45E-07	3.47E-16	1.33E-18	2.51E-16	5.87E-14	5.40E-14	0.00E+00	1.85E-14	1.18E-13	9.44E-14	9.45E-07
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.25E-12	8.18E-21	1.53E-24	2.55E-21	2.11E-19	1.70E-18	0.00E+00	6.66E-20	1.69E-19	1.94E-19	2.25E-12
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.50E-07	1.12E-17	9.47E-19	1.50E-16	3.20E-14	1.98E-14	0.00E+00	1.01E-14	7.63E-14	5.73E-14	3.50E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	9.37E-07	3.20E-16	1.76E-15	1.12E-12	9.89E-14	3.02E-13	0.00E+00	3.12E-14	7.80E-13	3.88E-13	9.37E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.38E-11	6.53E-21	1.25E-20	2.30E-18	3.17E-18	2.81E-18	0.00E+00	1.00E-18	1.87E-17	9.66E-18	3.38E-11
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.80E-05	5.77E-15	3.04E-16	2.52E-15	1.83E-15	2.83E-16	0.00E+00	4.27E-12	1.60E-11	1.99E-11	5.80E-05
	Th-227	mSv/a	0.00E+00	0.00E+00	5.28E-09	1.58E-17	1.22E-20	6.14E-17	8.43E-15	2.06E-13	0.00E+00	1.56E-16	8.95E-18	6.43E-17	5.28E-09
	Th-228	mSv/a	0.00E+00	0.00E+00	2.82E-13	2.07E-22	3.61E-23	1.04E-19	6.80E-19	9.60E-18	0.00E+00	1.25E-20	1.54E-21	7.61E-21	2.82E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	9.56E-08	9.35E-18	1.56E-16	2.60E-14	2.24E-13	1.48E-13	0.00E+00	4.14E-15	1.13E-15	2.86E-15	9.56E-08
	Th-230	mSv/a	0.00E+00	0.00E+00	6.16E-08	7.98E-20	1.16E-16	4.36E-15	1.67E-13	2.95E-14	0.00E+00	3.08E-15	8.42E-16	2.13E-15	6.16E-08
	Th-231	mSv/a	0.00E+00	0.00E+00	2.88E-10	1.05E-18	2.91E-23	3.98E-18	3.54E-16	2.24E-13	0.00E+00	6.54E-18	3.52E-20	7.42E-19	2.88E-10
	Th-232	mSv/a	0.00E+00	0.00E+00	5.43E-13	5.87E-25	9.11E-22	2.25E-18	1.31E-18	1.56E-17	0.00E+00	2.41E-20	6.61E-21	1.67E-20	5.43E-13
	Th-234	mSv/a	0.00E+00	0.00E+00	2.03E-08	3.01E-17	4.56E-20	2.14E-16	2.45E-14	1.16E-13	0.00E+00	4.52E-16	2.96E-17	2.02E-16	2.03E-08
	U-233	mSv/a	0.00E+00	0.00E+00	1.88E-06	5.69E-18	2.61E-15	1.92E-14	1.07E-15	2.69E-17	0.00E+00	1.21E-14	1.19E-13	2.70E-12	1.88E-06
	U-234	mSv/a	0.00E+00	0.00E+00	6.58E-06	7.92E-18	7.80E-15	1.85E-14	3.21E-15	5.49E-18	0.00E+00	3.60E-14	3.55E-13	8.07E-12	6.58E-06
	U-235	mSv/a	0.00E+00	0.00E+00	3.87E-06	3.32E-15	3.05E-15	2.00E-12	1.26E-15	3.74E-15	0.00E+00	1.41E-14	1.39E-13	3.16E-12	3.87E-06
	U-236	mSv/a	0.00E+00	0.00E+00	5.22E-06	2.78E-18	4.05E-15	8.75E-15	1.67E-15	1.63E-18	0.00E+00	1.87E-14	1.85E-13	4.20E-12	5.22E-06
	U-238	mSv/a	0.00E+00	0.00E+00	2.62E-05	1.28E-16	2.02E-14	1.04E-11	8.32E-15	4.27E-15	0.00E+00	9.33E-14	9.21E-13	2.09E-11	2.62E-05
	Total	**mSv/a**	**1.16E-07**	**8.61E-15**	**1.34E+00**	**5.41E-08**	**5.31E-12**	**4.00E-11**	**7.99E-06**	**3.19E-03**	**0.00E+00**	**6.99E-06**	**3.10E-06**	**4.49E-05**	**1.34E+00**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	2.35E-16	1.94E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	8.71E-15	4.45E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	1.24E-14	2.32E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	3.17E-14	4.41E-13
	C-14	mSv/a	7.29E-12	8.61E-15	0.00E+00	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	6.78E-05	7.47E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	9.87E-12	1.36E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	6.00E-11	6.22E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	2.59E-21	7.43E-21
	HTO	mSv/a	8.00E-08	0.00E+00	0.00E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	3.11E-06	3.51E-06
	I-129	mSv/a	6.53E-14	1.24E-18	0.00E+00	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	1.78E-09	1.84E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	4.73E-28	1.01E-22
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-10	1.71E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	2.89E-13	3.32E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	2.06E-07	2.57E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.40E-16	3.69E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.01E-18	9.79E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	2.61E-11	1.94E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	1.97E-07	4.99E-07

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	3.59E-12	2.90E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	8.68E-15	7.01E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	2.10E-13	5.74E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	4.54E-19	3.51E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	1.25E-13	3.20E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	4.23E-13	2.78E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	1.28E-17	3.62E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	5.42E-11	8.37E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	1.34E-16	2.97E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	1.27E-20	1.45E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	3.22E-15	6.34E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	2.54E-15	3.65E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	1.84E-18	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	1.81E-20	2.55E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	4.64E-16	2.43E-13
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.25E-12	4.38E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.24E-11	1.27E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	5.07E-12	7.79E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.83E-12	7.00E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.23E-11	4.66E-11
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**0.00E+00**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**7.13E-05**	**4.23E-03**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	9.64E-09	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	7.57E-17	9.64E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	2.52E-07	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	2.85E-15	2.52E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.83E-07	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	3.64E-16	1.83E-07
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.30E-06	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	1.23E-14	1.30E-06
	C-14	mSv/a	7.29E-12	8.61E-15	2.35E-01	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	1.18E-05	2.35E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	7.81E-06	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	2.09E-13	7.81E-06
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.68E-07	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	1.81E-12	1.68E-07
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.90E-14	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	1.02E-21	2.90E-14
	HTO	mSv/a	8.00E-08	0.00E+00	1.41E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	1.21E-07	1.41E+00
	I-129	mSv/a	6.53E-14	1.24E-18	3.90E-04	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	5.79E-11	3.90E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.76E-13	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	1.89E-28	2.76E-13
	Ni-59	mSv/a	0.00E+00	0.00E+00	6.93E-04	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-11	6.93E-04
	Np-237	mSv/a	0.00E+00	0.00E+00	8.10E-05	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	1.26E-13	8.10E-05
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	3.45E-08	8.54E-08
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.06E-07	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.25E-17	1.06E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	3.18E-09	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.11E-19	3.18E-09
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.20E-05	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	5.65E-12	1.20E-05
	Po-210	mSv/a	0.00E+00	0.00E+00	3.06E-01	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	9.84E-08	3.06E-01
	Pu-239	mSv/a	0.00E+00	0.00E+00	3.62E-03	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	7.40E-14	3.62E-03
	Pu-240	mSv/a	0.00E+00	0.00E+00	8.76E-05	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	1.79E-16	8.76E-05
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.51E-06	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	1.43E-14	1.51E-06
	Ra-224	mSv/a	0.00E+00	0.00E+00	3.74E-12	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	2.79E-20	3.74E-12
	Ra-225	mSv/a	0.00E+00	0.00E+00	5.51E-07	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	8.61E-15	5.51E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.36E-07	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	2.93E-14	7.36E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.23E-11	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	9.08E-19	3.23E-11
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.40E-04	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	9.64E-12	1.40E-04
	Th-227	mSv/a	0.00E+00	0.00E+00	1.05E-08	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	3.49E-17	1.05E-08
	Th-228	mSv/a	0.00E+00	0.00E+00	4.55E-13	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	3.39E-21	4.55E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	1.01E-07	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	7.91E-16	1.01E-07
	Th-230	mSv/a	0.00E+00	0.00E+00	6.89E-08	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	6.23E-16	6.89E-08
	Th-231	mSv/a	0.00E+00	0.00E+00	6.36E-10	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	3.84E-19	6.37E-10

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-232	mSv/a	0.00E+00	0.00E+00	5.51E-13	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	4.44E-21	5.51E-13
	Th-234	mSv/a	0.00E+00	0.00E+00	4.49E-08	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	1.22E-16	4.49E-08
	U-233	mSv/a	0.00E+00	0.00E+00	2.20E-06	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.18E-13	2.20E-06
	U-234	mSv/a	0.00E+00	0.00E+00	7.57E-06	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.22E-12	7.57E-06
	U-235	mSv/a	0.00E+00	0.00E+00	4.64E-06	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	4.98E-13	4.64E-06
	U-236	mSv/a	0.00E+00	0.00E+00	6.35E-06	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.72E-13	6.35E-06
	U-238	mSv/a	0.00E+00	0.00E+00	3.02E-05	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.18E-12	3.02E-05
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**1.96E+00**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**1.21E-05**	**1.96E+00**

Table D-12: Estimated Radiation Dose for On-site Farm Resident 3 Month Old with a Groundwater Well During Post-Closure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-11	8.16E-11
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.90E-09	8.90E-09
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-08	1.04E-08
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-08	1.33E-08
	C-14	mSv/a	3.07E-12	8.61E-15	0.00E+00	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-04	5.39E-04
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.88E-06	5.88E-06
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-07	4.56E-07
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-06	1.46E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-15	1.65E-15
	HTO	mSv/a	4.42E-08	0.00E+00	0.00E+00	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E+00	3.02E+00
	I-129	mSv/a	2.34E-14	1.24E-18	0.00E+00	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-04	6.20E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-16	7.08E-16
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-05	2.96E-05
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-07	1.90E-07
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-01	2.36E-01
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-06	2.92E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-02	3.34E-02
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.13E-06	5.13E-06
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-07	1.24E-07
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-08	4.48E-08
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.40E-14	9.40E-14
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-08	2.00E-08
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-08	2.22E-08
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-12	1.06E-12
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-05	1.93E-05
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-11	6.19E-11
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E-15	6.24E-15
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-09	1.52E-09
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.46E-10	9.46E-10
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-12	1.36E-12
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.73E-15	7.74E-15
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.86E-11	9.86E-11
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-08	3.68E-08
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-07	1.33E-07
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-08	7.69E-08
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-07	1.05E-07
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-07	4.87E-07
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**0.00E+00**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.29E+00**	**3.29E+00**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	3.29E-08	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-08
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.59E-06	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-06
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.44E-07	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-07
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.68E-06	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-06
	C-14	mSv/a	3.07E-12	8.61E-15	2.75E-01	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.41E-05	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-05
	Cl-36	mSv/a	0.00E+00	0.00E+00	3.48E-07	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-07
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.87E-13	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-13
	HTO	mSv/a	4.42E-08	0.00E+00	2.49E+00	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E+00
	I-129	mSv/a	2.34E-14	1.24E-18	4.27E-04	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	5.71E-13	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.71E-13
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.74E-03	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-03

	Np-237	mSv/a	0.00E+00	0.00E+00	1.03E-03	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-03
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.52E-06	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-06
	Pa-233	mSv/a	0.00E+00	0.00E+00	6.65E-09	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.65E-09
	Pb-210	mSv/a	0.00E+00	0.00E+00	3.75E-05	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-05
	Po-210	mSv/a	0.00E+00	0.00E+00	1.21E+00	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+00
	Pu-239	mSv/a	0.00E+00	0.00E+00	4.83E-02	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-02
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.17E-03	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-03
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.73E-06	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-06
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.04E-11	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-11
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.35E-06	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E-06
	Ra-226	mSv/a	0.00E+00	0.00E+00	4.81E-06	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-06
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.29E-10	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-10
	Tc-99	mSv/a	0.00E+00	0.00E+00	3.90E-04	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E-04
	Th-227	mSv/a	0.00E+00	0.00E+00	6.02E-08	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E-08
	Th-228	mSv/a	0.00E+00	0.00E+00	6.07E-12	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-12
	Th-229	mSv/a	0.00E+00	0.00E+00	1.48E-06	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-06
	Th-230	mSv/a	0.00E+00	0.00E+00	9.20E-07	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-07
	Th-231	mSv/a	0.00E+00	0.00E+00	1.33E-09	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-09
	Th-232	mSv/a	0.00E+00	0.00E+00	7.53E-12	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.53E-12
	Th-234	mSv/a	0.00E+00	0.00E+00	9.59E-08	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-08
	U-233	mSv/a	0.00E+00	0.00E+00	7.99E-06	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-06
	U-234	mSv/a	0.00E+00	0.00E+00	2.88E-05	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-05
	U-235	mSv/a	0.00E+00	0.00E+00	1.67E-05	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-05
	U-236	mSv/a	0.00E+00	0.00E+00	2.28E-05	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-05
	U-238	mSv/a	0.00E+00	0.00E+00	1.14E-04	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**4.02E+00**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.02E+00**

Table D-13: Doses for Non-Radionuclides to On-site Farm Resident with a Groundwater Well during Post-Closure

Human Type	Non-radionuclide	Unit	Dose by Pathway												Total
			Groundwater Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	
Adult	Cd	mg/kg bw/day	8.26E-02	1.22E-09	6.98E-11	7.72E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	8.26E-02
	Pb	mg/kg bw/day	5.62E-01	1.50E-07	8.58E-08	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	5.62E-01
Toddler	Cd	mg/kg bw/day	1.42E-01	2.10E-08	1.36E-10	1.65E-09	2.48E-09	1.17E-07	1.04E-09	6.73E-09	5.01E-09	2.08E-09	7.51E-09	0.00E+00	1.42E-01
	Pb	mg/kg bw/day	9.64E-01	2.58E-06	1.67E-07	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	9.64E-01

3.3 Risk Estimates

3.3.1 Radionuclides

The radiological dose to the on-site farmer receptors that drink groundwater from a well in the plume from WRDF does not exceed the upper IAEA reference level for all receptors, but does exceed the lower IAEA reference level for all receptors, except the infant who drinks cow's milk. The dominant nuclide and pathway in this instance are HTO through water ingestion which contributes 72, 76 and 80% of the total dose for the infant, child and adult respectively. All doses are below the 20 mSv/a reference level for disruptive events (IAEA 2011).

While Table D-14 presents the results based on the conservative assumption that the on-site residents are exposed to the maximum groundwater concentrations for all COPCs in the plume at the same time, Figure D-1 shows a more realistic representation of predicted dose rate to the on-site residents over the post-closure phase from the disruptive event. The dose to most receptors peaks prior to the end of institutional control, and is due to tritium; however, the well in plume scenario is only considered credible after the end of the 100-year institutional control period. Around the 1,000-year mark, the dose is dominated by carbon-14, and around the 100,000 year mark the dose is dominated by polonium-210.

Table D-14: Summary of Total Dose for Post-Closure Human Receptors at an On-Site Farm with Groundwater Well and Comparison to Limits

Age Group	Dose (mSv/a)
Adult	**2.54E+00**
Child	**1.34E+00**
Infant (cow's milk)	4.23E-03
Infant (formula)	**1.96E+00**
3 month old (nursing)	**3.29E+00**
3 month old (formula)	**4.02E+00**

Notes:
Bold cells indicate exceedance of the lower IAEA reference level of 1 mSv/a and shaded cells indicate exceedance of the upper IAEA reference level of 20 mSv/a.

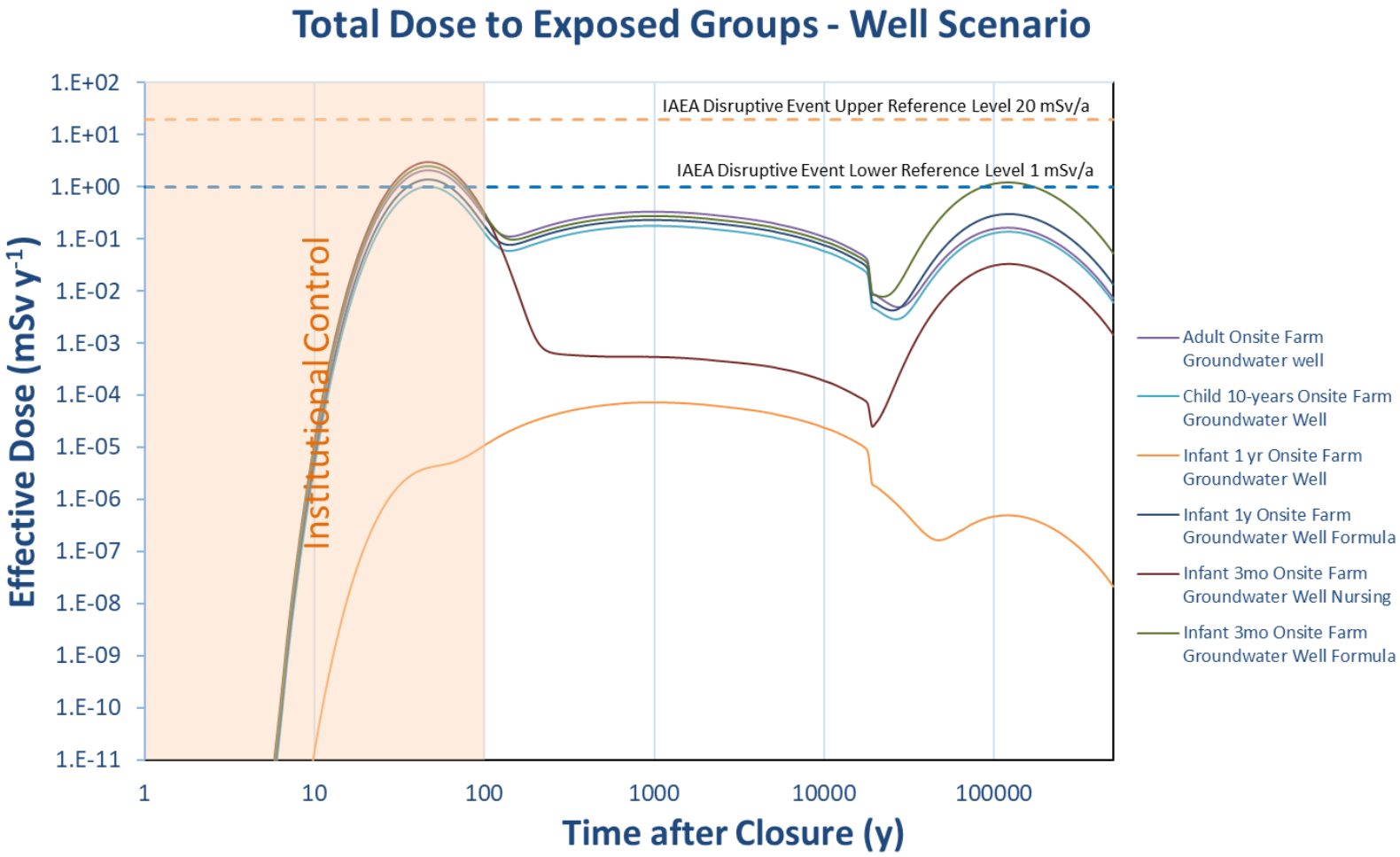

Figure D-1: Dose Rate to Human Receptors from Disruptive Events Scenario – Well in Plume

3.3.2 Non-Radionuclides

The hazard quotients for non-radionuclides are presented in Table D-15. For non-radionuclides the hazard quotients for cadmium and lead exceed the target value for the adult and toddler, based on the drinking water pathway. Risk could not be ruled out for the on-site farmer drinking groundwater in the plume of WRDF. The hazard quotients for cadmium and lead for all other pathways are below the target value for both adult and toddler.

Table D-15: Hazard Quotients for On-site Farm with Groundwater Well during Post-Closure

Human Type	Non-radionuclide	Groundwater Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Adult	Cd	**8.26E+01**	1.22E-06	6.98E-08	7.72E-07	2.36E-06	1.12E-04	2.52E-06	7.38E-06	6.60E-06	4.38E-06	9.06E-07	4.41E-08	**8.26E+01**
	Pb	**3.04E+02**	8.13E-05	4.64E-05	5.13E-05	4.64E-05	2.80E-03	3.87E-05	6.54E-04	2.18E-05	3.24E-04	1.18E-04	6.49E-07	**3.04E+02**
Toddler	Cd	**1.42E+02**	2.10E-05	1.36E-07	1.65E-06	2.48E-06	1.17E-04	1.04E-06	6.73E-06	5.01E-06	2.08E-06	7.51E-06	0.00E+00	**1.42E+02**
	Pb	**5.21E+02**	1.39E-03	9.04E-05	1.10E-04	4.89E-05	2.94E-03	1.60E-05	5.96E-04	1.66E-05	1.53E-04	9.81E-04	0.00E+00	**5.21E+02**

Notes:
Bold and shaded values indicate HQ greater than 0.2.

3.4 Summary

Dose to human receptors from radionuclides for the well in plume scenario is within the acceptable range of the IAEA reference level (1 to 20 mSv/a) for disruptive events. Ingestion of HTO through water constitutes the dominant exposure pathway in each case.

For non-radionuclides, risk could not be ruled out for the on-site farmer drinking groundwater in the plume of WRDF, due to cadmium and lead. However, the assessment is based on the assumption that the groundwater well is situated in the plume at the time of maximum loadings, which is a conservative assumption.

4.0 WRDF Barrier Failure

For this disruptive scenario, an open fracture was modeled in the foundation of the WRDF. Everything is the same as in the normal evolution scenario, except that groundwater loadings to surface water are based on an open fracture, which changes the groundwater pathway flow rate to the Winnipeg River. This is identified as Scenario 3 in the sensitivity cases evaluated in the Groundwater Flow and Solute Transport Modelling Report (Golder, 2021). It was configured to evaluate the potential changes in groundwater flow rates through the building materials in the event of a failure of the foundation. The assumption is that excess voids are present in the foundation resulting in non-conformance of the WRDF.

4.1 Selection of Radionuclides and Non-Radionuclides

The mass and activity are presented in Table D-16 and Table D-17. All radionuclides that break through to the Winnipeg River were carried forward for quantitative risk analysis, whereas non-radionuclides were screened against criteria in Table D-18 (human health) and Table D-19 (ecological health).

Table D-16: Mass and Activity Loadings to the Winnipeg River for Radionuclides in Groundwater with WRDF Failure

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Ac-225	1.70E-17	88,400	225.02	8.64E+05	1.16E-09
Ac-227	1.41E-14	159,800	227.03	6.87E+08	1.20E-09
Ag-108m	8.10E-13	3,645	107.906	1.38E+10	7.19E-09
Am-241	0	N/A	241.06	1.36E+10	0.00E+00
Am-243	0	N/A	243.06	2.32E+11	0.00E+00
Bi-210	2.29E-14	208,100	209.98	4.33E+05	3.33E-06
C-14	5.65E-04	937	14.00	1.81E+11	2.96E+00
Ca-41	1.56E-06	20,300	40.96	3.22E+12	1.56E-04
Cl-36	1.20E-08	168	35.97	9.46E+12	4.67E-07
Cm-244	0	N/A	244.06	5.71E+08	0.00E+00

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Co-60	0	N/A	59.93	1.67E+08	0.00E+00
Cs-137	0	N/A	137.91	9.51E+08	0.00E+00
Eu-152	0	N/A	151.92	4.26E+08	0.00E+00
Eu-154	0	N/A	153.92	2.71E+08	0.00E+00
Eu-155	0	N/A	154.92	1.50E+08	0.00E+00
Fe-55	0	N/A	54.94	8.51E+07	0.00E+00
Gd-152	1.84E-07	208	151.92	3.41E+21	4.72E-15
H-3	6.73E-05	68	3.026	3.89E+08	7.61E+02
I-129	1.50E-04	168	128.90	4.95E+14	3.11E-05
Nb-94	6.62E-21	626,000*	93.91	6.40E+11	1.46E-18
Nd-144	0	N/A	143.91	7.22E+22	0.00E+00
Ni-59	5.48E-05	491,200	58.93	3.19E+12	3.86E-03
Ni-63	0	N/A	62.93	3.15E+09	0.00E+00
Np-237	5.15E-06	41,400	237.05	6.75E+13	4.26E-06
Np-239	0	N/A	239.05	2.04E+05	0.00E+00
Pa-231	2.16E-11	161,700	231.04	1.03E+12	1.20E-09
Pa-233	2.33E-16	41,600	233.04	2.33E+06	5.68E-09
Pb-210	9.29E-13	209,700	209.98	7.03E+08	8.33E-08
Po-210	1.64E-10	206,900	209.98	1.19E+07	8.69E-04
Pu-238	0	N/A	238.05	2.77E+09	0.00E+00
Pu-239	2.39E-07	108,400	239.05	7.60E+11	1.74E-05
Pu-240	1.59E-10	67,100	240.05	2.07E+11	4.23E-08
Pu-241	0	N/A	241.06	4.42E+08	0.00E+00
Ra-223	3.36E-16	161,200	223.02	9.88E+05	2.02E-08
Ra-224	6.67E-22	1,894,000*	224.02	3.14E+05	1.26E-13
Ra-225	2.17E-16	89,500	225.02	1.29E+06	9.91E-09
Ra-226	1.65E-11	207,500	226.03	5.05E+10	1.91E-08
Ra-228	3.9E-19	930,000*	228.03	1.80E+08	1.26E-13
Rn-222	4.82E-12	208,600	222.02	3.30E+05	8.70E-04
Sm-148	1.40E-24	2,066	147.91	2.21E+23	5.65E-34
Sr-90	0	N/A	89.91	9.08E+08	0.00E+00
Tc-99	1.60E-05	10,500	98.91	6.65E+12	3.21E-04
Th-227	6.12E-17	161,000	227.03	1.61E+06	2.21E-09
Th-228	2.84E-20	1,082,000*	228.03	6.03E+07	2.73E-14
Th-229	8.68E-12	89,000	229.03	2.30E+11	2.18E-09
Th-230	1.73E-10	206,200	230.03	2.38E+12	4.19E-09
Th-231	4.36E-18	118,000	231.04	9.19E+04	2.89E-09
Th-232	2.12E-10	632,000*	232.04	4.45E+17	2.72E-14

Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)	Atomic mass, (g/mol)	Half-life (s)	Release Rate (Bq/s)
Th-234	7.35E-16	116,400	234.04	2.08E+06	2.00E-08
U-233	2.79E-08	76,800	233.04	5.02E+12	3.16E-07
U-234	1.36E-07	130,300	234.04	7.74E+12	9.94E-07
U-235	1.60E-04	118,200	235.04	2.22E+16	4.05E-07
U-236	7.21E-06	120,100	236.05	7.40E+14	5.46E-07
U-237	0	N/A	237.05	5.83E+05	0.00E+00
U-238	7.10E-03	116,300	238.05	1.41E+17	2.80E-0
Y-90	0	N/A	89.91	2.31E+05	0.00E+00

Note:
* The model was run for 500,000 years. For these radionuclide contaminants, the maximum loading was not reached before 500,000 years; therefore, the model runtime was extended until the maximum was reached.

Table D-17: Mass Loadings to the Winnipeg River for Non-Radionuclides in Groundwater with WRDF Failure

Non-Radionuclide	Maximum Loading (g/a)	Time of Maximum (yr)
Argon	7.07E-12	222
Boron	1.87E-04	4,171
Barium	1.49E-23	499,900
Bismuth	1.11E-08	78,200
Cadmium	3.71E-01	203,300
Cobalt	2.12E-02	93,900
Chromium	4.94E-27	500,000
Copper	5.47E-04	876,000*
Gadolinium	6.98E-06	212
HB-40	4.13E+01	10,300
Helium	1.12E-02	146
Mercury	4.16E-05	6,576,000*
Potassium	3.27E-07	13,500
Potassium hydroxide	4.94E-02	140
Manganese	8.33E-05	359,100
Molybdenum	1.17E-02	17,900
Nitrogen	5.44E-04	17,900
Nickel	4.81E-05	842,000*
Lead	5.14E+00	4,430,000*
Palladium	1.05E-01	121,100
Ruthenium	6.15E-09	438,500
Sulphur	2.46E-12	195
Xenon	1.45E-09	203
Xylene	4.59E+00	200

Note:
* The model was run for 500,000 years. For these non-radionuclide contaminants, the maximum loading was not reached before 500,000 years; therefore, the model runtime was extended until the maximum was reached.

Table D-18: Human Health Screening of Non-Radionuclides in Surface Water with WRDF Failure

Non-radionuclide	Groundwater Concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	CDWS MAC (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Argon	1.09E-10	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Boron	2.30E-03	1.00E+01	5000		1500	200	1200	-	CDWS MAC	No
Barium	1.95E-22	1.10E+01	1000					0.4	CDWS MAC	No
Bismuth	1.46E-07	<2.00E-01						0.25	LC_{50}/100 – Borgmann et al., 2005	No
Cadmium	4.86E+00	1.00E-02	5	0.137	0.08	0.1	0.114	-	CDWS MAC	No#
Cobalt	2.77E-01	2.00E-01				0.9	4	-	PWQO Ontario	No
Chromium	6.47E-26	1.70E+00	50	37.1	1.0 (VI)	1 (VI)		-	CDWS MAC	No
Copper	7.17E-03	1.40E+01		4.3	2	5	2	-	CCME WQG	No
Gadolinium	1.07E-04	-						1.5	LC_{50}/100 – Borgmann et al., 2005	No
HB-40	5.41E+02	0.00E+00	8800^						See Note^	No
Helium	1.72E-01	-	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Mercury	5.45E-04	1.00E-02	1	1	0.026	0.2		-	CCME WQG	No
Potassium	4.29E-06	9.07E+02						5300	LCV/10 – Suter and Tsao, 1996	No
Potassium hydroxide (as K)	5.32E-01	-						5300	LCV/10 – Suter and Tsao, 1996	No
Manganese	1.09E-03	1.10E+01	None - natural				794.2	110	WQG BC	No

Non-radionuclide	Groundwater Concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	CDWS MAC (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
			ly occurring							
Molybdenum	1.54E-01	2.00E-01			73	40	1000	-	CCME WQG	No
Nitrogen	7.13E-03	-	1000				3000		CDWS MAC	No
Nickel	6.31E-04	1.78E+00		25.5	25	25		-	CCME WQG	No
Lead	**6.74E+01**	2.60E+00	10	0.99	1	3	4.4		CDWS MAC	**Yes**
Palladium	1.37E+00	-						5.7	LC_{50}/100 – Borgmann et al., 2005	No
Ruthenium	8.06E-08	-						10	LC_{50}/100 – Borgmann et al., 2005	No
Sulphur (as SO_4)	1.14E-10	-					218000		WQG BC	No
Xenon	2.24E-08	-	-	-	-	-	-	-	Noble Gas – not applicable	NA
Xylene	7.06E+01	-	90			2/40/30 (m/o/p)	30		CDWS MAC	No

Notes:
*Noble gases were assumed to volatilize rapidly.
^Derived drinking water limit based on a minimal effect level in mice of 250 mg/kg-day (Weeks, 1974), divided by 1000, times 70 kg body weight, over 2 L/day of drinking water.
[#] Cadmium did not exceed screening benchmark, but was carried forward for comparison against the normal evolution scenario.
Background water quality was obtained from Section 6.4.2, Table 6.4.2-5 of the EIS
CDWS = Canadian Drinking Water Standard (HC, 2017)
WQSOG = Manitoba Water Quality Standards, Objectives and Guidelines (MWS, 2011)
CCME WQG = Canadian Council of Ministers of the Environment Water Quality Guideline (CCME, 1999)
PWQO = Ontario Provincial Water Quality Objective (MOEE, 1994)
WQG BC = Water Quality Guideline British Columbia (BC MOE, 2017)

Table D-19: Ecological Health Screening of Non-Radionuclides in Surface Water with WRDF Failure

Non-radionuclide	Groundwater concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Argon	1.09E-10	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Boron	2.30E-03	1.00E+01		1500	200	1200	-	CCME WQG	No
Barium	1.95E-22	1.10E+01					0.4	LCV/10 – Suter and Tsao, 1996	No
Bismuth	1.46E-07	<2.00E-01					0.25	LC_{50}/100 – Borgmann et al., 2005	No
Cadmium	**4.86E+00**	1.00E-02	0.137	0.08	0.1	0.114	-	CCME WQG	**Yes**
Cobalt	2.77E-01	2.00E-01			0.9	4	-	PWQO Ontario	No
Chromium	6.47E-26	1.70E+00	37.1	1.0 (VI)	1 (VI)		-	CCME WQG	No
Copper	7.17E-03	1.40E+01	4.3	2	5	2	-	CCME WQG	No
Gadolinium	1.07E-04	-					1.5	LC_{50}/100 – Borgmann et al., 2005	No
HB-40	**5.41E+02**	0.00E+00					2	IC_{25}/10 – EcoMetrix, 2017	**Yes**
Helium	1.72E-01	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Mercury	5.45E-04	1.00E-02	1	0.026	0.2		-	CCME WQG	No
Potassium	4.29E-06	9.07E+02					5300	LCV/10 – Suter and Tsao, 1996	No
Potassium hydroxide (as K)	5.32E-01	-					5300	LCV/10 – Suter and Tsao, 1996	No
Manganese	1.09E-03	1.10E+01				794.2	110	WQG BC	No
Molybdenum	1.54E-01	2.00E-01		73	40	1000	-	CCME WQG	No
Nitrogen	7.13E-03	-				3000		WQG BC	No
Nickel	6.31E-04	1.78E+00	25.5	25	25		-	CCME WQG	No
Lead	**6.74E+01**	2.60E+00	0.99	1	3	4.4		WQSOG Manitoba	**Yes**

Non-radionuclide	Groundwater concentration (µg/L)	Background Winnipeg River Concentration (µg/L)	WQSOG Manitoba (µg/L)	CCME WQG (µg/L)	PWQO Ontario (µg/L)	WQG BC (µg/L)	Toxicity Benchmark (µg/L)	Selected Benchmark	COPC?
Palladium	1.37E+00	-					5.7	LC_{50}/100 – Borgmann et al., 2005	No
Ruthenium	8.06E-08	-					10	LC_{50}/100 – Borgmann et al., 2005	No
Sulphur (as SO_4)	1.14E-10	-				218000		WQG BC	No
Xenon	2.24E-08	-	-	-	-	-	-	Noble Gas – not applicable*	NA
Xylene	**7.06E+01**	-			2/40/30 (m/o/p)	30		WQG BC (in preference over interim PWQO)	**Yes**

Notes:
*Noble gases were assumed to volatilize rapidly.
Background water quality was obtained from Section 6.4.2, Table 6.4.2-5 of the EIS
WQSOG = Manitoba Water Quality Standards, Objectives and Guidelines (MWS, 2011)
CCME WQG = Canadian Council of Ministers of the Environment Water Quality Guideline (CCME, 1999)
PWQO = Ontario Provincial Water Quality Objective (MOEE, 1994)
WQG BC = Water Quality Guideline British Columbia (BC MOE, 2017)

4.2 Doses

Estimated doses for radionuclides are presented in Table D-20, Table D-21, Table D-22, Table D-23, Table D-24, and Table D-25. For non-radionuclides, the groundwater flowrate through the bedrock pathway to the Winnipeg River (from Table 5-4 in Golder, 2021, Scenario 3), used to calculate groundwater concentrations, is presented in Table D-26. The estimated surface water concentrations for different locations in the Winnipeg River are presented in Table D-27. Estimated doses for non-radionuclides are presented in Table D-28, Table D-29, Table D-30, and Table D-31.

Table D-20: Estimated Radiation Dose for Harvester during Post-Closure WRDF Failure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-14	5.75E-16	0.00E+00	3.55E-16	2.06E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.33E-13	2.73E-14	0.00E+00	1.69E-14	9.78E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-16	2.51E-15	0.00E+00	3.61E-16	3.00E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-14	2.21E-13	0.00E+00	3.67E-15	2.55E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-06	1.35E-05	0.00E+00	1.45E-05	3.01E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-12	8.20E-14	0.00E+00	1.13E-13	2.56E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.67E-15	2.82E-14	0.00E+00	3.11E-14	6.39E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	1.74E-05
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-19	8.02E-21	0.00E+00	1.63E-20	2.32E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-09	1.58E-08	0.00E+00	1.16E-08	2.99E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-11	2.84E-11	0.00E+00	1.76E-11	9.82E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.40E-25	1.03E-24	0.00E+00	3.00E-29	1.67E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-12	7.06E-12	0.00E+00	1.01E-12	1.08E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-10	1.94E-11	0.00E+00	2.35E-12	2.13E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.28E-10	6.77E-09	0.00E+00	1.82E-09	9.41E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-14	1.17E-14	0.00E+00	3.97E-17	6.66E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-16	6.83E-17	0.00E+00	2.29E-19	3.87E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-12	2.38E-10	0.00E+00	1.46E-12	2.41E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-07	2.16E-07	0.00E+00	4.84E-08	3.65E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-09	1.26E-07	0.00E+00	8.44E-13	1.30E-07
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-12	3.07E-10	0.00E+00	2.05E-15	3.16E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-13	1.12E-14	0.00E+00	3.13E-14	5.64E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-18	4.51E-20	0.00E+00	1.26E-19	2.28E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-13	5.42E-15	0.00E+00	1.52E-14	2.74E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-12	2.96E-14	0.00E+00	8.36E-14	1.49E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-17	4.80E-19	0.00E+00	1.35E-18	2.43E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-13	5.67E-12	0.00E+00	6.59E-14	6.07E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-15	1.61E-16	0.00E+00	1.14E-16	9.48E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-19	1.63E-20	0.00E+00	1.16E-20	9.59E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-13	8.85E-15	0.00E+00	6.29E-15	5.20E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-13	7.29E-15	0.00E+00	5.18E-15	4.29E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-16	8.12E-18	0.00E+00	5.75E-18	4.77E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-18	5.19E-20	0.00E+00	3.69E-20	3.05E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-14	5.62E-16	0.00E+00	3.99E-16	3.31E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-12	2.14E-14	0.00E+00	4.16E-13	4.25E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-11	6.46E-14	0.00E+00	1.26E-12	1.28E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-12	2.53E-14	0.00E+00	4.92E-13	5.02E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-12	3.41E-14	0.00E+00	6.63E-13	6.77E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-11	1.67E-13	0.00E+00	3.25E-12	3.32E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.29E-06**	**1.39E-05**	**0.00E+00**	**3.19E-05**	**4.81E-05**
Child-10y-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-14	9.08E-16	0.00E+00	3.58E-16	3.46E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.58E-13	2.61E-14	0.00E+00	1.03E-14	9.94E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-16	3.30E-15	0.00E+00	3.02E-16	3.77E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-14	3.47E-13	0.00E+00	3.66E-15	4.01E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-06	1.31E-05	0.00E+00	8.92E-06	2.43E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.49E-12	1.46E-13	0.00E+00	1.28E-13	4.76E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.18E-15	4.05E-14	0.00E+00	2.84E-14	7.61E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-06	5.99E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-19	7.28E-21	0.00E+00	9.42E-21	2.19E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-09	1.38E-08	0.00E+00	6.51E-09	2.27E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-11	3.45E-11	0.00E+00	1.36E-11	1.16E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.62E-25	1.44E-24	0.00E+00	2.69E-29	2.41E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-12	8.67E-12	0.00E+00	7.89E-13	1.30E-11

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-10	1.37E-11	0.00E+00	1.05E-12	1.59E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.53E-10	6.51E-09	0.00E+00	1.11E-09	8.48E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-14	1.07E-14	0.00E+00	2.30E-17	6.41E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-16	1.05E-16	0.00E+00	2.24E-19	6.29E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-12	4.61E-10	0.00E+00	1.80E-12	4.65E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-07	3.29E-07	0.00E+00	4.69E-08	5.41E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-09	9.60E-08	0.00E+00	4.08E-13	9.90E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.39E-12	2.33E-10	0.00E+00	9.90E-16	2.40E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-12	3.53E-14	0.00E+00	6.30E-14	1.86E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-18	1.27E-19	0.00E+00	2.25E-19	6.69E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.62E-13	1.92E-14	0.00E+00	3.44E-14	1.02E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-12	5.93E-14	0.00E+00	1.07E-13	3.13E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-17	1.91E-18	0.00E+00	3.43E-18	1.01E-16
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.13E-13	8.10E-12	0.00E+00	5.99E-14	8.67E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-14	2.96E-16	0.00E+00	1.34E-16	1.85E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-18	2.39E-20	0.00E+00	1.08E-20	1.49E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-13	7.87E-15	0.00E+00	3.56E-15	4.92E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-13	5.85E-15	0.00E+00	2.65E-15	3.66E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-16	1.24E-17	0.00E+00	5.60E-18	7.77E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-18	4.59E-20	0.00E+00	2.08E-20	2.87E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-14	8.60E-16	0.00E+00	3.89E-16	5.38E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-12	2.30E-14	0.00E+00	2.85E-13	4.70E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-11	6.86E-14	0.00E+00	8.50E-13	1.40E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-12	2.68E-14	0.00E+00	3.32E-13	5.48E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-12	3.56E-14	0.00E+00	4.42E-13	7.28E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-11	1.78E-13	0.00E+00	2.20E-12	3.63E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.43E-06**	**1.35E-05**	**0.00E+00**	**1.50E-05**	**3.09E-05**
Infant_1y-Havester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-14	1.05E-15	0.00E+00	4.01E-16	4.99E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.64E-13	1.88E-14	0.00E+00	7.16E-15	8.90E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-16	2.94E-15	0.00E+00	2.60E-16	3.39E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.31E-14	4.04E-13	0.00E+00	4.12E-15	4.81E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-06	9.12E-06	0.00E+00	6.01E-06	1.71E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-12	5.49E-14	0.00E+00	4.66E-14	2.23E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-14	4.67E-14	0.00E+00	3.17E-14	8.88E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-06	2.42E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-19	5.74E-21	0.00E+00	7.17E-21	2.13E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-09	1.02E-08	0.00E+00	4.64E-09	1.70E-08
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-11	1.39E-11	0.00E+00	5.29E-12	5.35E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-24	1.43E-24	0.00E+00	2.58E-29	2.63E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-12	9.33E-12	0.00E+00	8.20E-13	1.50E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-10	9.08E-12	0.00E+00	6.76E-13	1.30E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.68E-10	4.68E-09	0.00E+00	7.73E-10	6.22E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-14	5.26E-15	0.00E+00	1.09E-17	3.82E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-16	1.19E-16	0.00E+00	2.45E-19	8.66E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-12	3.04E-10	0.00E+00	1.15E-12	3.07E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-07	3.88E-07	0.00E+00	5.34E-08	6.85E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-09	5.20E-08	0.00E+00	2.14E-13	5.41E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-12	1.26E-10	0.00E+00	5.18E-16	1.31E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-12	3.01E-14	0.00E+00	5.18E-14	1.97E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.03E-18	1.12E-19	0.00E+00	1.93E-19	7.33E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-12	1.61E-14	0.00E+00	2.77E-14	1.05E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-12	2.48E-14	0.00E+00	4.31E-14	1.62E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-17	9.71E-19	0.00E+00	1.68E-18	6.35E-17

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.27E-13	1.04E-11	0.00E+00	7.44E-14	1.13E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-14	3.14E-16	0.00E+00	1.37E-16	2.45E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-18	2.05E-20	0.00E+00	8.97E-21	1.60E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-13	4.42E-15	0.00E+00	1.93E-15	3.45E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-13	3.48E-15	0.00E+00	1.52E-15	2.72E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-15	1.46E-17	0.00E+00	6.37E-18	1.14E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-18	2.48E-20	0.00E+00	1.09E-20	1.94E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.75E-14	1.01E-15	0.00E+00	4.42E-16	7.90E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-12	1.44E-14	0.00E+00	1.72E-13	3.62E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-11	4.20E-14	0.00E+00	5.02E-13	1.06E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-12	1.71E-14	0.00E+00	2.05E-13	4.31E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.52E-12	2.31E-14	0.00E+00	2.76E-13	5.82E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-11	1.09E-13	0.00E+00	1.31E-12	2.75E-11
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.22E-06**	**9.58E-06**	**0.00E+00**	**8.48E-06**	**2.03E-05**

Table D-21: Estimated Radiation Dose for Farm A Resident during Post-Closure WRDF Failure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	6.92E-17	2.73E-19	4.82E-24	2.10E-19	5.58E-20	9.77E-18	0.00E+00	5.63E-18	9.34E-19	1.16E-18	8.72E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.31E-15	5.81E-21	1.18E-19	1.71E-16	2.67E-18	1.87E-17	0.00E+00	2.69E-16	1.64E-16	1.17E-16	4.05E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	4.17E-17	1.32E-17	2.22E-21	6.44E-15	1.88E-18	2.73E-14	0.00E+00	2.49E-17	1.67E-17	3.34E-17	3.39E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.07E-14	1.05E-17	3.74E-22	2.32E-17	2.54E-17	5.34E-16	0.00E+00	2.15E-15	8.38E-18	2.34E-16	1.37E-14
	C-14	mSv/a	1.30E-13	1.50E-16	4.32E-09	9.18E-14	5.19E-16	2.60E-14	1.02E-13	5.45E-14	0.00E+00	1.34E-07	5.50E-08	6.97E-07	8.90E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	7.47E-14	0.00E+00	3.32E-18	0.00E+00	6.73E-18	0.00E+00	0.00E+00	8.11E-16	1.08E-13	4.69E-14	2.31E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.09E-15	9.80E-19	1.11E-20	3.07E-16	1.04E-20	6.07E-19	0.00E+00	2.79E-16	2.75E-14	1.22E-13	1.51E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-08	3.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	4.87E-22	0.00E+00	2.93E-26	0.00E+00	2.29E-25	0.00E+00	0.00E+00	7.92E-23	4.17E-23	5.61E-23	6.64E-22
	HTO	mSv/a	1.84E-09	0.00E+00	3.83E-08	1.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-10	9.19E-09	1.73E-08	6.81E-08
	I-129	mSv/a	1.82E-15	1.69E-20	8.62E-12	2.20E-16	1.10E-16	8.03E-14	1.80E-14	9.38E-15	0.00E+00	2.81E-13	5.22E-13	1.34E-11	2.29E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	6.24E-27	2.45E-27	3.90E-31	1.41E-24	5.03E-30	9.01E-26	0.00E+00	1.02E-26	5.56E-28	4.37E-30	1.52E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	6.13E-13	0.00E+00	3.77E-17	0.00E+00	4.07E-16	0.00E+00	0.00E+00	6.98E-14	7.27E-13	4.64E-13	1.87E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	1.18E-12	1.13E-16	4.83E-17	3.84E-13	5.60E-18	2.04E-16	0.00E+00	1.92E-13	5.80E-14	1.24E-14	1.83E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.69E-11	1.53E-09	2.09E-09	3.68E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.14E-15	4.87E-20	1.34E-19	2.47E-16	5.48E-18	4.33E-17	0.00E+00	1.16E-16	2.24E-16	4.80E-18	2.78E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.24E-17	1.14E-18	2.33E-24	2.07E-18	3.18E-20	1.35E-16	0.00E+00	6.73E-19	3.00E-19	1.72E-20	1.51E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.45E-13	1.28E-19	5.17E-18	1.15E-15	8.92E-17	5.07E-18	0.00E+00	2.35E-12	1.15E-13	1.73E-13	2.79E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.62E-09	8.44E-18	2.52E-15	7.17E-17	1.62E-15	2.33E-19	0.00E+00	2.14E-09	9.38E-10	2.16E-09	7.86E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.10E-11	1.47E-18	6.76E-16	3.17E-15	1.25E-12	5.66E-15	0.00E+00	1.25E-09	4.62E-14	2.53E-14	1.26E-09
	Pu-240	mSv/a	0.00E+00	0.00E+00	2.66E-14	3.64E-21	1.64E-18	1.63E-17	3.03E-15	7.70E-18	0.00E+00	3.03E-12	1.12E-16	6.14E-17	3.06E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	5.05E-15	6.47E-18	4.02E-22	4.69E-18	1.77E-17	1.01E-15	0.00E+00	1.10E-16	7.49E-16	3.79E-16	7.32E-15
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.01E-20	1.50E-22	5.11E-28	4.68E-23	7.04E-23	3.13E-20	0.00E+00	4.35E-22	1.19E-21	8.31E-22	5.41E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.45E-15	2.10E-19	2.55E-22	2.80E-18	8.61E-18	3.70E-16	0.00E+00	5.33E-17	4.33E-16	2.06E-16	3.53E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.35E-14	6.01E-18	8.43E-19	2.10E-14	4.73E-17	5.66E-15	0.00E+00	2.92E-16	7.88E-15	2.49E-15	5.08E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.19E-19	1.23E-22	3.04E-24	4.32E-20	7.68E-22	5.29E-20	0.00E+00	4.75E-21	9.54E-20	3.16E-20	4.48E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.17E-13	1.08E-16	2.04E-19	4.73E-17	1.23E-18	5.30E-18	0.00E+00	5.61E-14	2.26E-13	2.31E-13	1.03E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	4.87E-17	2.95E-19	6.34E-24	1.15E-18	4.39E-18	3.86E-15	0.00E+00	1.59E-18	9.83E-20	6.45E-19	3.92E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	4.96E-21	3.90E-24	2.37E-26	1.96E-21	4.46E-22	1.81E-19	0.00E+00	1.61E-22	2.14E-23	9.69E-23	1.88E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	2.69E-15	1.76E-19	1.68E-19	4.89E-16	2.42E-16	2.79E-15	0.00E+00	8.75E-17	2.59E-17	5.88E-17	6.38E-15
	Th-230	mSv/a	0.00E+00	0.00E+00	2.21E-15	1.50E-21	1.39E-19	8.19E-17	2.00E-16	5.54E-16	0.00E+00	7.21E-17	2.13E-17	4.84E-17	3.19E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	2.27E-18	1.82E-20	1.68E-26	6.87E-20	2.05E-19	3.88E-15	0.00E+00	7.39E-20	4.29E-22	7.62E-21	3.88E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	1.58E-20	1.10E-26	9.89E-25	4.22E-20	1.42E-21	2.93E-19	0.00E+00	5.13E-22	1.52E-22	3.45E-22	3.54E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.70E-16	5.65E-19	2.85E-23	4.01E-18	1.53E-17	2.17E-15	0.00E+00	5.54E-18	3.91E-19	2.44E-18	2.36E-15
	U-233	mSv/a	0.00E+00	0.00E+00	4.06E-14	1.07E-19	2.34E-18	3.62E-16	9.62E-19	5.07E-19	0.00E+00	2.11E-16	2.25E-15	3.08E-14	7.42E-14
	U-234	mSv/a	0.00E+00	0.00E+00	1.23E-13	1.49E-19	7.07E-18	3.49E-16	2.91E-18	1.03E-19	0.00E+00	6.39E-16	6.81E-15	9.30E-14	2.23E-13
	U-235	mSv/a	0.00E+00	0.00E+00	4.79E-14	6.24E-17	2.76E-18	3.77E-14	1.14E-18	7.04E-17	0.00E+00	2.50E-16	2.66E-15	3.63E-14	1.25E-13
	U-236	mSv/a	0.00E+00	0.00E+00	6.47E-14	5.24E-20	3.72E-18	1.65E-16	1.53E-18	3.06E-20	0.00E+00	3.37E-16	3.59E-15	4.90E-14	1.18E-13
	U-238	mSv/a	0.00E+00	0.00E+00	3.17E-13	2.41E-18	1.83E-17	1.95E-13	7.53E-18	8.03E-17	0.00E+00	1.65E-15	1.76E-14	2.41E-13	7.72E-13
	Total	**mSv/a**	**1.84E-09**	**1.50E-16**	**4.53E-08**	**1.29E-09**	**3.96E-15**	**7.56E-13**	**7.91E-08**	**3.34E-04**	**0.00E+00**	**1.37E-07**	**6.66E-08**	**7.19E-07**	**3.35E-04**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	6.20E-17	2.73E-19	1.49E-22	2.10E-19	1.73E-18	9.77E-18	0.00E+00	8.90E-18	1.37E-18	1.98E-18	8.62E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.80E-15	5.81E-21	2.22E-18	1.71E-16	5.01E-17	1.87E-17	0.00E+00	2.58E-16	1.45E-16	1.20E-16	2.56E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.10E-17	1.32E-17	5.70E-20	6.44E-15	4.82E-17	2.73E-14	0.00E+00	3.26E-17	2.03E-17	9.26E-17	3.40E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	9.51E-15	1.05E-17	1.15E-20	2.32E-17	7.79E-16	5.34E-16	0.00E+00	3.37E-15	1.22E-17	2.98E-16	1.45E-14
	C-14	mSv/a	1.86E-13	1.50E-16	2.37E-09	9.18E-14	9.83E-15	2.60E-14	1.94E-12	5.45E-14	0.00E+00	1.29E-07	4.94E-08	8.27E-07	1.01E-06
	Ca-41	mSv/a	0.00E+00	0.00E+00	7.52E-14	0.00E+00	1.15E-16	0.00E+00	2.34E-16	0.00E+00	0.00E+00	1.44E-15	1.78E-13	1.70E-13	4.25E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	8.89E-16	9.80E-19	3.13E-19	3.07E-16	2.91E-19	6.07E-19	0.00E+00	4.00E-16	3.65E-14	3.55E-13	3.93E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.37E-07	3.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.51E-22	0.00E+00	5.20E-25	0.00E+00	4.06E-24	0.00E+00	0.00E+00	7.19E-23	3.51E-23	4.02E-23	4.02E-22
	HTO	mSv/a	2.19E-09	0.00E+00	1.91E-08	1.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-10	7.47E-09	2.95E-08	5.94E-08
	I-129	mSv/a	3.06E-15	1.69E-20	5.93E-12	2.20E-16	2.61E-15	8.03E-14	4.27E-13	9.38E-15	0.00E+00	3.40E-13	5.87E-13	3.04E-11	3.78E-11

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.97E-27	2.45E-27	1.07E-29	1.41E-24	1.38E-28	9.01E-26	0.00E+00	1.43E-26	7.23E-28	5.71E-30	1.52E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.26E-13	0.00E+00	9.05E-16	0.00E+00	9.77E-15	0.00E+00	0.00E+00	8.56E-14	8.25E-13	7.92E-13	2.14E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	4.70E-13	1.13E-16	6.65E-16	3.84E-13	7.70E-17	2.04E-16	0.00E+00	1.35E-13	3.78E-14	5.26E-15	1.03E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-11	1.36E-09	2.51E-09	3.93E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.10E-15	4.87E-20	2.38E-18	2.47E-16	9.76E-17	4.33E-17	0.00E+00	1.06E-16	1.88E-16	6.61E-18	1.79E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.08E-17	1.14E-18	6.99E-23	2.07E-18	9.54E-19	1.35E-16	0.00E+00	1.03E-18	4.27E-19	3.94E-20	1.51E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.59E-13	1.28E-19	1.96E-16	1.15E-15	3.38E-15	5.07E-18	0.00E+00	4.55E-12	2.06E-13	3.54E-13	5.28E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.26E-09	8.44E-18	7.51E-14	7.17E-17	4.82E-14	2.33E-19	0.00E+00	3.25E-09	1.32E-09	2.37E-09	9.21E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	4.72E-12	1.47E-18	1.00E-14	3.17E-15	1.85E-11	5.66E-15	0.00E+00	9.48E-10	3.25E-14	4.27E-14	9.72E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.14E-14	3.64E-21	2.43E-17	1.63E-17	4.50E-14	7.70E-18	0.00E+00	2.30E-12	7.89E-17	1.03E-16	2.36E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.04E-15	6.47E-18	2.49E-20	4.69E-18	1.10E-15	1.01E-15	0.00E+00	3.46E-16	2.20E-15	1.76E-15	1.55E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	3.19E-20	1.50E-22	2.81E-26	4.68E-23	3.87E-21	3.13E-20	0.00E+00	1.22E-21	3.11E-21	3.55E-21	7.52E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.94E-15	2.10E-19	1.77E-20	2.80E-18	5.98E-16	3.70E-16	0.00E+00	1.89E-16	1.42E-15	1.07E-15	8.59E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.53E-14	6.01E-18	3.31E-17	2.10E-14	1.86E-15	5.66E-15	0.00E+00	5.86E-16	1.47E-14	7.29E-15	6.64E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.92E-19	1.23E-22	2.36E-22	4.32E-20	5.97E-20	5.29E-20	0.00E+00	1.88E-20	3.51E-19	1.82E-19	1.20E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	4.18E-13	1.08E-16	5.70E-18	4.73E-17	3.42E-17	5.30E-18	0.00E+00	8.00E-14	2.99E-13	3.72E-13	1.17E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	5.07E-17	2.95E-19	2.28E-22	1.15E-18	1.58E-16	3.86E-15	0.00E+00	2.91E-18	1.67E-19	1.20E-18	4.07E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	4.11E-21	3.90E-24	6.79E-25	1.96E-21	1.28E-20	1.81E-19	0.00E+00	2.36E-22	2.90E-23	1.43E-22	2.00E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.35E-15	1.76E-19	2.93E-18	4.89E-16	4.21E-15	2.79E-15	0.00E+00	7.77E-17	2.13E-17	5.38E-17	9.00E-15
	Th-230	mSv/a	0.00E+00	0.00E+00	1.01E-15	1.50E-21	2.18E-18	8.19E-17	3.14E-15	5.54E-16	0.00E+00	5.78E-17	1.58E-17	4.00E-17	4.90E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	1.97E-18	1.82E-20	5.04E-25	6.87E-20	6.12E-18	3.88E-15	0.00E+00	1.13E-19	6.08E-22	1.28E-20	3.88E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	7.91E-21	1.10E-26	1.71E-23	4.22E-20	2.46E-20	2.93E-19	0.00E+00	4.54E-22	1.24E-22	3.14E-22	3.69E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.47E-16	5.65E-19	8.54E-22	4.01E-18	4.59E-16	2.17E-15	0.00E+00	8.47E-18	5.54E-19	3.78E-18	2.79E-15
	U-233	mSv/a	0.00E+00	0.00E+00	2.47E-14	1.07E-19	4.91E-17	3.62E-16	2.02E-17	5.07E-19	0.00E+00	2.27E-16	2.24E-15	5.09E-14	7.85E-14
	U-234	mSv/a	0.00E+00	0.00E+00	7.37E-14	1.49E-19	1.47E-16	3.49E-16	6.04E-17	1.03E-19	0.00E+00	6.78E-16	6.69E-15	1.52E-13	2.34E-13
	U-235	mSv/a	0.00E+00	0.00E+00	2.88E-14	6.24E-17	5.74E-17	3.77E-14	2.36E-17	7.04E-17	0.00E+00	2.65E-16	2.61E-15	5.94E-14	1.29E-13
	U-236	mSv/a	0.00E+00	0.00E+00	3.83E-14	5.24E-20	7.63E-17	1.65E-16	3.14E-17	3.06E-20	0.00E+00	3.52E-16	3.48E-15	7.90E-14	1.21E-13
	U-238	mSv/a	0.00E+00	0.00E+00	1.91E-13	2.41E-18	3.80E-16	1.95E-13	1.56E-16	8.03E-17	0.00E+00	1.75E-15	1.73E-14	3.93E-13	7.99E-13
	Total	**mSv/a**	**2.19E-09**	**1.50E-16**	**2.37E-08**	**1.08E-09**	**1.00E-13**	**7.56E-13**	**8.37E-07**	**3.34E-04**	**0.00E+00**	**1.34E-07**	**5.96E-08**	**8.62E-07**	**3.36E-04**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.77E-20	5.51E-22	2.73E-19	6.38E-18	1.27E-17	0.00E+00	1.03E-17	1.88E-18	4.38E-18	3.60E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-21	5.08E-18	2.22E-16	1.15E-16	2.43E-17	0.00E+00	1.86E-16	1.20E-16	1.63E-16	8.36E-16
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.28E-18	1.62E-19	8.37E-15	1.37E-16	3.55E-14	0.00E+00	2.91E-17	2.14E-17	2.38E-16	4.43E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.26E-20	3.01E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	5.85E-16	8.14E-15
	C-14	mSv/a	1.27E-13	1.50E-16	0.00E+00	1.75E-14	2.18E-14	2.60E-14	4.31E-12	5.45E-14	0.00E+00	9.01E-08	4.08E-08	1.30E-06	1.43E-06
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-16	0.00E+00	2.81E-16	0.00E+00	0.00E+00	5.43E-16	6.98E-14	1.86E-13	2.57E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.87E-19	1.15E-18	3.07E-16	1.07E-18	6.07E-19	0.00E+00	4.62E-16	4.16E-14	1.18E-12	1.22E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-06	4.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-24	0.00E+00	1.02E-23	0.00E+00	0.00E+00	5.67E-23	2.98E-23	5.26E-23	1.51E-22
	HTO	mSv/a	1.51E-09	0.00E+00	0.00E+00	2.83E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-10	6.09E-09	6.15E-08	6.95E-08
	I-129	mSv/a	1.16E-15	2.20E-20	0.00E+00	5.45E-17	3.35E-15	1.04E-13	5.49E-13	1.22E-14	0.00E+00	1.37E-13	2.67E-13	3.45E-11	3.56E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.06E-28	3.39E-29	1.83E-24	4.38E-28	1.17E-25	0.00E+00	1.42E-26	7.72E-28	9.15E-30	1.96E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-15	0.00E+00	3.35E-14	0.00E+00	0.00E+00	9.22E-14	9.34E-13	2.15E-12	3.21E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.80E-17	1.41E-15	4.98E-13	1.63E-16	2.65E-16	0.00E+00	8.98E-14	2.88E-14	5.44E-15	6.24E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-11	9.59E-10	4.08E-09	5.09E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.21E-20	3.73E-18	3.21E-16	1.53E-16	5.63E-17	0.00E+00	5.20E-17	9.83E-17	8.26E-18	6.93E-16
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-19	2.53E-22	2.70E-18	3.45E-18	1.75E-16	0.00E+00	1.17E-18	5.74E-19	1.13E-19	1.84E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	4.92E-13	3.65E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	2.82E-13	9.33E-17	1.81E-13	3.03E-19	0.00E+00	3.83E-09	1.85E-09	3.71E-09	9.40E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-19	1.73E-14	4.12E-15	3.20E-11	7.36E-15	0.00E+00	5.14E-10	2.07E-14	6.76E-14	5.46E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.01E-22	4.20E-17	2.11E-17	7.76E-14	1.00E-17	0.00E+00	1.25E-12	5.02E-17	1.64E-16	1.32E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.60E-18	6.74E-20	6.10E-18	2.97E-15	1.31E-15	0.00E+00	2.95E-16	2.21E-15	3.92E-15	1.07E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	7.92E-26	6.09E-23	1.09E-20	4.07E-20	0.00E+00	1.08E-21	3.26E-21	8.33E-21	6.43E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.20E-20	4.71E-20	3.64E-18	1.59E-15	4.81E-16	0.00E+00	1.58E-16	1.41E-15	2.33E-15	5.98E-15

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	4.41E-17	2.72E-14	2.47E-15	7.39E-15	0.00E+00	2.45E-16	6.87E-15	7.94E-15	5.22E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	3.82E-22	5.62E-20	9.67E-20	6.88E-20	0.00E+00	9.59E-21	2.09E-19	2.40E-19	6.80E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.06E-17	2.34E-17	4.73E-17	1.40E-16	5.30E-18	0.00E+00	1.03E-13	4.49E-13	1.02E-12	1.57E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.31E-20	7.69E-22	1.50E-18	5.33E-16	5.01E-15	0.00E+00	3.09E-18	2.10E-19	2.50E-18	5.55E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.67E-25	1.86E-24	2.55E-21	3.50E-20	2.34E-19	0.00E+00	2.03E-22	2.91E-23	2.40E-22	2.72E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.35E-20	5.24E-18	6.38E-16	7.54E-15	3.62E-15	0.00E+00	4.37E-17	1.28E-17	6.05E-17	1.19E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	4.77E-17	6.86E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.51E-21	1.89E-24	8.93E-20	2.29E-17	5.04E-15	0.00E+00	1.33E-19	8.47E-22	3.19E-20	5.06E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	2.95E-23	5.49E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.17E-23	3.40E-22	4.79E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.40E-19	3.20E-21	5.22E-18	1.72E-15	2.81E-15	0.00E+00	9.97E-18	7.72E-19	8.70E-18	4.56E-15
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.65E-20	9.78E-17	4.70E-16	4.03E-17	6.59E-19	0.00E+00	1.42E-16	1.58E-15	8.00E-14	8.24E-14
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.69E-20	2.86E-16	4.53E-16	1.18E-16	1.34E-19	0.00E+00	4.15E-16	4.62E-15	2.34E-13	2.40E-13
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.54E-17	1.16E-16	4.90E-14	4.79E-17	9.15E-17	0.00E+00	1.69E-16	1.88E-15	9.53E-14	1.47E-13
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.30E-20	1.57E-16	2.14E-16	6.47E-17	3.98E-20	0.00E+00	2.28E-16	2.54E-15	1.29E-13	1.32E-13
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.95E-19	7.43E-16	2.53E-13	3.06E-16	1.04E-16	0.00E+00	1.08E-15	1.20E-14	6.08E-13	8.76E-13
	Total	**mSv/a**	**1.51E-09**	**1.50E-16**	**0.00E+00**	**2.83E-10**	**3.31E-13**	**9.75E-13**	**1.11E-06**	**4.34E-04**	**0.00E+00**	**9.46E-08**	**4.97E-08**	**1.37E-06**	**4.37E-04**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	1.35E-16	6.77E-20	5.51E-22	2.73E-19	6.38E-18	1.27E-17	0.00E+00	1.03E-17	1.88E-18	1.41E-18	1.68E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	2.43E-15	1.44E-21	5.08E-18	2.22E-16	1.15E-16	2.43E-17	0.00E+00	1.86E-16	1.20E-16	5.35E-17	3.16E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	5.19E-17	3.28E-18	1.62E-19	8.37E-15	1.37E-16	3.55E-14	0.00E+00	2.91E-17	2.14E-17	6.96E-18	4.41E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.08E-14	2.61E-18	4.26E-20	3.01E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	2.27E-16	2.86E-14
	C-14	mSv/a	1.27E-13	1.50E-16	3.11E-09	1.75E-14	2.18E-14	2.60E-14	4.31E-12	5.45E-14	0.00E+00	9.01E-08	4.08E-08	2.26E-07	3.60E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	5.33E-14	0.00E+00	1.38E-16	0.00E+00	2.81E-16	0.00E+00	0.00E+00	5.43E-16	6.98E-14	3.94E-15	1.28E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.93E-15	1.87E-19	1.15E-18	3.07E-16	1.07E-18	6.07E-19	0.00E+00	4.62E-16	4.16E-14	3.56E-14	7.99E-14
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-06	4.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E-04
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.71E-22	0.00E+00	1.31E-24	0.00E+00	1.02E-23	0.00E+00	0.00E+00	5.67E-23	2.98E-23	2.07E-23	4.90E-22
	HTO	mSv/a	1.51E-09	0.00E+00	2.65E-08	2.83E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-10	6.09E-09	2.40E-09	3.68E-08
	I-129	mSv/a	1.16E-15	2.20E-20	4.49E-12	5.45E-17	3.35E-15	1.04E-13	5.49E-13	1.22E-14	0.00E+00	1.37E-13	2.67E-13	1.12E-12	6.69E-12
	Nb-94	mSv/a	0.00E+00	0.00E+00	9.28E-27	6.06E-28	3.39E-29	1.83E-24	4.38E-28	1.17E-25	0.00E+00	1.42E-26	7.72E-28	3.67E-30	1.97E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	8.62E-13	0.00E+00	3.10E-15	0.00E+00	3.35E-14	0.00E+00	0.00E+00	9.22E-14	9.34E-13	2.14E-13	2.14E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	5.88E-13	2.80E-17	1.41E-15	4.98E-13	1.63E-16	2.65E-16	0.00E+00	8.98E-14	2.88E-14	2.36E-15	1.21E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-11	9.59E-10	6.84E-10	1.69E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.02E-15	1.21E-20	3.73E-18	3.21E-16	1.53E-16	5.63E-17	0.00E+00	5.20E-17	9.83E-17	7.98E-19	1.71E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.30E-17	2.82E-19	2.53E-22	2.70E-18	3.45E-18	1.75E-16	0.00E+00	1.17E-18	5.74E-19	1.15E-20	2.07E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.97E-13	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	1.06E-13	3.47E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	5.02E-09	2.09E-18	2.82E-13	9.33E-17	1.81E-13	3.03E-19	0.00E+00	3.83E-09	1.85E-09	1.85E-09	1.25E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	4.81E-12	3.64E-19	1.73E-14	4.12E-15	3.20E-11	7.36E-15	0.00E+00	5.14E-10	2.07E-14	1.39E-15	5.51E-10
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.17E-14	9.01E-22	4.20E-17	2.11E-17	7.76E-14	1.00E-17	0.00E+00	1.25E-12	5.02E-17	3.38E-18	1.34E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.45E-14	1.60E-18	6.74E-20	6.10E-18	2.97E-15	1.31E-15	0.00E+00	2.95E-16	2.21E-15	2.67E-16	2.15E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	5.31E-20	3.72E-23	7.92E-26	6.09E-23	1.09E-20	4.07E-20	0.00E+00	1.08E-21	3.26E-21	5.12E-22	1.10E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	7.75E-15	5.20E-20	4.71E-20	3.64E-18	1.59E-15	4.81E-16	0.00E+00	1.58E-16	1.41E-15	1.61E-16	1.16E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.20E-14	1.49E-18	4.41E-17	2.72E-14	2.47E-15	7.39E-15	0.00E+00	2.45E-16	6.87E-15	5.50E-16	5.69E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.71E-19	3.04E-23	3.82E-22	5.62E-20	9.67E-20	6.88E-20	0.00E+00	9.59E-21	2.09E-19	1.71E-20	9.28E-19
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.01E-12	2.06E-17	2.34E-17	4.73E-17	1.40E-16	5.30E-18	0.00E+00	1.03E-13	4.49E-13	1.81E-13	1.74E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	1.01E-16	7.31E-20	7.69E-22	1.50E-18	5.33E-16	5.01E-15	0.00E+00	3.09E-18	2.10E-19	6.52E-19	5.65E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	6.64E-21	9.67E-25	1.86E-24	2.55E-21	3.50E-20	2.34E-19	0.00E+00	2.03E-22	2.91E-23	6.37E-23	2.79E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.43E-15	4.35E-20	5.24E-18	6.38E-16	7.54E-15	3.62E-15	0.00E+00	4.37E-17	1.28E-17	1.49E-17	1.33E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	1.13E-15	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	1.17E-17	7.95E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	4.35E-18	4.51E-21	1.89E-24	8.93E-20	2.29E-17	5.04E-15	0.00E+00	1.33E-19	8.47E-22	6.63E-21	5.07E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	8.03E-21	2.74E-27	2.95E-23	5.49E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.17E-23	8.35E-23	4.87E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	3.26E-16	1.40E-19	3.20E-21	5.22E-18	1.72E-15	2.81E-15	0.00E+00	9.97E-18	7.72E-19	2.28E-18	4.88E-15
	U-233	mSv/a	0.00E+00	0.00E+00	2.90E-14	2.65E-20	9.78E-17	4.70E-16	4.03E-17	6.59E-19	0.00E+00	1.42E-16	1.58E-15	7.87E-15	3.92E-14
	U-234	mSv/a	0.00E+00	0.00E+00	8.48E-14	3.69E-20	2.86E-16	4.53E-16	1.18E-16	1.34E-19	0.00E+00	4.15E-16	4.62E-15	2.30E-14	1.14E-13
	U-235	mSv/a	0.00E+00	0.00E+00	3.46E-14	1.54E-17	1.16E-16	4.90E-14	4.79E-17	9.15E-17	0.00E+00	1.69E-16	1.88E-15	9.37E-15	9.52E-14

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-236	mSv/a	0.00E+00	0.00E+00	4.66E-14	1.30E-20	1.57E-16	2.14E-16	6.47E-17	3.98E-20	0.00E+00	2.28E-16	2.54E-15	1.26E-14	6.24E-14
	U-238	mSv/a	0.00E+00	0.00E+00	2.21E-13	5.95E-19	7.43E-16	2.53E-13	3.06E-16	1.04E-16	0.00E+00	1.08E-15	1.20E-14	5.98E-14	5.48E-13
	Total	**mSv/a**	**1.51E-09**	**1.50E-16**	**3.46E-08**	**2.83E-10**	**3.31E-13**	**9.75E-13**	**1.11E-06**	**4.34E-04**	**0.00E+00**	**9.46E-08**	**4.97E-08**	**2.31E-07**	**4.36E-04**

Table D-22: Estimated Radiation Dose for Farm A Resident 3 Month Old During Post-Closure WRDF Failure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.77E-20	8.78E-22	2.73E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-18	1.64E-18
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-21	3.37E-17	2.22E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-16	3.62E-16
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.28E-18	1.01E-19	8.37E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-17	8.39E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.10E-20	3.01E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-16	2.95E-16
	C-14	mSv/a	5.34E-14	1.50E-16	0.00E+00	1.75E-14	1.19E-14	2.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-05	1.03E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-13	1.89E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.87E-19	1.12E-18	3.07E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.21E-13	7.22E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-07	1.53E-07
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.14E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-23	3.87E-23
	HTO	mSv/a	8.32E-10	0.00E+00	0.00E+00	2.28E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-07	1.29E-07
	I-129	mSv/a	4.16E-16	2.20E-20	0.00E+00	5.45E-17	1.71E-15	1.04E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-11	1.70E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.06E-28	3.27E-29	1.83E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.65E-29	1.83E-24
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-13	1.64E-13
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.80E-17	8.35E-15	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-15	5.09E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-09	4.94E-09
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.21E-20	2.50E-17	3.21E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-16
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-19	2.47E-22	2.70E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-18
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	5.98E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-13	9.40E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	5.19E-13	9.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-09	1.83E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-19	1.08E-13	4.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-13	8.81E-13
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.01E-22	2.61E-16	2.11E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-15	2.15E-15
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.60E-18	2.02E-19	6.10E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-16	6.38E-16
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	2.02E-25	6.09E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-21	1.71E-21
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.20E-20	1.74E-19	3.64E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-16	4.42E-16
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	1.34E-16	2.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-16	2.83E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	1.27E-21	5.62E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-20	9.26E-20
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.06E-17	3.03E-17	4.73E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-13	3.59E-13
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.31E-20	2.05E-21	1.50E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-19	2.54E-18
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.67E-25	1.16E-23	2.55E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-22	2.71E-21
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.35E-20	3.59E-17	6.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-17	7.09E-16
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-17	1.58E-16
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.51E-21	1.83E-24	8.93E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-20	1.09E-19
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	1.88E-22	5.49E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-22	5.53E-20
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.40E-19	3.19E-21	5.22E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-18	6.53E-18
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.65E-20	1.65E-16	4.70E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.31E-16	1.47E-15
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.69E-20	5.07E-16	4.53E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-15	3.51E-15
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.54E-17	1.95E-16	4.90E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-16	5.02E-14
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.30E-20	2.63E-16	2.14E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-15	1.80E-15
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.95E-19	1.31E-15	2.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-15	2.61E-13
	Total	**mSv/a**	**8.32E-10**	**1.50E-16**	**0.00E+00**	**2.28E-10**	**6.56E-13**	**9.75E-13**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.06E-05**	**1.06E-05**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	4.62E-16	6.77E-20	8.78E-22	2.73E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.62E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.46E-14	1.44E-21	3.37E-17	2.22E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	6.93E-17	3.28E-18	1.01E-19	8.37E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.44E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	4.30E-14	2.61E-18	4.10E-20	3.01E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-14
	C-14	mSv/a	5.34E-14	1.50E-16	3.63E-09	1.75E-14	1.19E-14	2.60E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-09
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.64E-13	0.00E+00	1.99E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-13
	Cl-36	mSv/a	0.00E+00	0.00E+00	4.01E-15	1.87E-19	1.12E-18	3.07E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-15
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	4.96E-21	0.00E+00	8.14E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-21
	HTO	mSv/a	8.32E-10	0.00E+00	4.67E-08	2.28E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.77E-08
	I-129	mSv/a	4.16E-16	2.20E-20	4.91E-12	5.45E-17	1.71E-15	1.04E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-12
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.92E-26	6.06E-28	3.27E-29	1.83E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-24

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.17E-12	0.00E+00	3.64E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	7.47E-12	2.80E-17	8.35E-15	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.47E-14	1.21E-20	2.50E-17	3.21E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	4.81E-17	2.82E-19	2.47E-22	2.70E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E-17
	Pb-210	mSv/a	0.00E+00	0.00E+00	6.13E-13	3.16E-20	5.98E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	1.98E-08	2.09E-18	5.19E-13	9.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	6.42E-11	3.64E-19	1.08E-13	4.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-11
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.56E-13	9.01E-22	2.61E-16	2.11E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-13
	Ra-223	mSv/a	0.00E+00	0.00E+00	9.31E-14	1.60E-18	2.02E-19	6.10E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.90E-19	3.72E-23	2.02E-25	6.09E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	6.13E-14	5.20E-20	1.74E-19	3.64E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.87E-14	1.49E-18	1.34E-16	2.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.34E-18	3.04E-23	1.27E-21	5.62E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.81E-12	2.06E-17	3.03E-17	4.73E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	5.78E-16	7.31E-20	2.05E-21	1.50E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.80E-16
	Th-228	mSv/a	0.00E+00	0.00E+00	8.86E-20	9.67E-25	1.16E-23	2.55E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-20
	Th-229	mSv/a	0.00E+00	0.00E+00	2.10E-14	4.35E-20	3.59E-17	6.38E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	1.50E-14	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-14
	Th-231	mSv/a	0.00E+00	0.00E+00	9.07E-18	4.51E-21	1.83E-24	8.93E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.16E-18
	Th-232	mSv/a	0.00E+00	0.00E+00	1.10E-19	2.74E-27	1.88E-22	5.49E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	6.97E-16	1.40E-19	3.19E-21	5.22E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.02E-16
	U-233	mSv/a	0.00E+00	0.00E+00	1.05E-13	2.65E-20	1.65E-16	4.70E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13
	U-234	mSv/a	0.00E+00	0.00E+00	3.22E-13	3.69E-20	5.07E-16	4.53E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-13
	U-235	mSv/a	0.00E+00	0.00E+00	1.24E-13	1.54E-17	1.95E-16	4.90E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-13
	U-236	mSv/a	0.00E+00	0.00E+00	1.68E-13	1.30E-20	2.63E-16	2.14E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-13
	U-238	mSv/a	0.00E+00	0.00E+00	8.35E-13	5.95E-19	1.31E-15	2.53E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-12
	Total	**mSv/a**	**8.32E-10**	**1.50E-16**	**7.02E-08**	**2.28E-10**	**6.56E-13**	**9.75E-13**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**7.12E-08**

Table D-23: Estimated Radiation Dose for On-site Farm Resident during Post-Closure WRDF Failure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	3.71E-15	1.47E-17	2.59E-22	1.13E-17	2.99E-18	5.24E-16	0.00E+00	3.02E-16	5.01E-17	6.24E-17	4.68E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.76E-13	3.09E-19	6.28E-18	9.10E-15	1.42E-16	9.94E-16	0.00E+00	1.43E-14	8.70E-15	6.22E-15	2.16E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.22E-15	7.04E-16	1.18E-19	3.42E-13	9.98E-17	1.45E-12	0.00E+00	1.32E-15	8.86E-16	1.78E-15	1.80E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.80E-13	5.70E-16	2.03E-20	1.26E-15	1.38E-15	2.89E-14	0.00E+00	1.16E-13	4.53E-16	1.26E-14	7.42E-13
	C-14	mSv/a	7.62E-12	8.76E-15	2.30E-07	4.88E-12	2.76E-14	1.38E-12	5.45E-12	2.90E-12	0.00E+00	7.10E-06	2.92E-06	3.71E-05	4.73E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	3.97E-12	0.00E+00	1.76E-16	0.00E+00	3.58E-16	0.00E+00	0.00E+00	4.31E-14	5.77E-12	2.49E-12	1.23E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	5.81E-14	5.21E-17	5.93E-19	1.63E-14	5.51E-19	3.23E-17	0.00E+00	1.48E-14	1.46E-12	6.47E-12	8.03E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-07	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.59E-20	0.00E+00	1.56E-24	0.00E+00	1.22E-23	0.00E+00	0.00E+00	4.21E-21	2.22E-21	2.98E-21	3.53E-20
	HTO	mSv/a	1.03E-07	0.00E+00	2.04E-06	6.87E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.28E-09	4.92E-07	9.25E-07	3.63E-06
	I-129	mSv/a	1.06E-13	9.89E-19	4.59E-10	1.17E-14	5.84E-15	4.27E-12	9.57E-13	4.99E-13	0.00E+00	1.49E-11	2.79E-11	7.20E-10	1.23E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	3.32E-25	1.30E-25	2.07E-29	7.48E-23	2.67E-28	4.79E-24	0.00E+00	5.40E-25	2.96E-26	2.32E-28	8.06E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	3.26E-11	0.00E+00	2.00E-15	0.00E+00	2.16E-14	0.00E+00	0.00E+00	3.71E-12	3.87E-11	2.47E-11	9.97E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	6.28E-11	6.00E-15	2.57E-15	2.04E-11	2.98E-16	1.08E-14	0.00E+00	1.02E-11	3.09E-12	6.57E-13	9.72E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.56E-09	8.17E-08	1.11E-07	1.97E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.14E-13	2.59E-18	7.11E-18	1.31E-14	2.91E-16	2.30E-15	0.00E+00	6.17E-15	1.19E-14	2.55E-16	1.48E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	6.62E-16	6.08E-17	1.24E-22	1.11E-16	1.69E-18	7.19E-15	0.00E+00	3.59E-17	1.60E-17	9.19E-19	8.08E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	7.70E-12	6.78E-18	2.75E-16	6.13E-14	4.74E-15	2.70E-16	0.00E+00	1.25E-10	6.13E-12	9.20E-12	1.48E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.40E-07	4.49E-16	1.34E-13	3.82E-15	8.61E-14	1.24E-17	0.00E+00	1.14E-07	4.99E-08	1.15E-07	4.18E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	5.84E-10	7.82E-17	3.60E-14	1.68E-13	6.64E-11	3.01E-13	0.00E+00	6.65E-08	2.46E-12	1.35E-12	6.71E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.42E-12	1.93E-19	8.71E-17	8.65E-16	1.61E-13	4.10E-16	0.00E+00	1.61E-10	5.96E-15	3.27E-15	1.63E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.71E-13	3.47E-16	2.15E-20	2.52E-16	9.49E-16	5.40E-14	0.00E+00	5.87E-15	4.01E-14	2.03E-14	3.92E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.09E-18	8.18E-21	2.79E-26	2.55E-21	3.84E-21	1.70E-18	0.00E+00	2.37E-20	6.50E-20	4.53E-20	2.95E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	1.31E-13	1.12E-17	1.36E-20	1.50E-16	4.61E-16	1.98E-14	0.00E+00	2.85E-15	2.32E-14	1.10E-14	1.89E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.16E-13	3.20E-16	4.48E-17	1.11E-12	2.51E-15	3.01E-13	0.00E+00	1.55E-14	4.19E-13	1.33E-13	2.70E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.16E-17	6.53E-21	1.61E-22	2.30E-18	4.08E-20	2.81E-18	0.00E+00	2.52E-19	5.08E-18	1.68E-18	2.38E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.75E-11	5.75E-15	1.09E-17	2.51E-15	6.52E-17	2.82E-16	0.00E+00	2.98E-12	1.20E-11	1.23E-11	5.48E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	2.60E-15	1.58E-17	3.39E-22	6.14E-17	2.35E-16	2.06E-13	0.00E+00	8.47E-17	5.25E-18	3.44E-17	2.09E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.64E-19	2.07E-22	1.26E-24	1.04E-19	2.37E-20	9.60E-18	0.00E+00	8.57E-21	1.14E-21	5.16E-21	1.00E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	1.43E-13	9.34E-18	8.95E-18	2.60E-14	1.29E-14	1.48E-13	0.00E+00	4.65E-15	1.37E-15	3.13E-15	3.39E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	1.18E-13	7.98E-20	7.39E-18	4.36E-15	1.06E-14	2.95E-14	0.00E+00	3.83E-15	1.13E-15	2.58E-15	1.70E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	1.31E-16	1.05E-18	9.73E-25	3.97E-18	1.18E-17	2.24E-13	0.00E+00	4.27E-18	2.48E-20	4.41E-19	2.24E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	8.38E-19	5.87E-25	5.26E-23	2.25E-18	7.55E-20	1.56E-17	0.00E+00	2.73E-20	8.06E-21	1.83E-20	1.88E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	9.09E-15	3.01E-17	1.52E-21	2.14E-16	8.19E-16	1.16E-13	0.00E+00	2.96E-16	2.09E-17	1.30E-16	1.26E-13
	U-233	mSv/a	0.00E+00	0.00E+00	2.16E-12	5.70E-18	1.24E-16	1.92E-14	5.12E-17	2.70E-17	0.00E+00	1.12E-14	1.20E-13	1.64E-12	3.94E-12
	U-234	mSv/a	0.00E+00	0.00E+00	6.52E-12	7.92E-18	3.76E-16	1.85E-14	1.55E-16	5.49E-18	0.00E+00	3.40E-14	3.62E-13	4.94E-12	1.19E-11
	U-235	mSv/a	0.00E+00	0.00E+00	2.55E-12	3.32E-15	1.47E-16	2.00E-12	6.04E-17	3.74E-15	0.00E+00	1.33E-14	1.41E-13	1.93E-12	6.65E-12
	U-236	mSv/a	0.00E+00	0.00E+00	3.44E-12	2.79E-18	1.98E-16	8.75E-15	8.15E-17	1.63E-18	0.00E+00	1.79E-14	1.91E-13	2.61E-12	6.26E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.69E-11	1.28E-16	9.72E-16	1.04E-11	4.00E-16	4.27E-15	0.00E+00	8.79E-14	9.36E-13	1.28E-11	4.11E-11
	Total	**mSv/a**	**1.03E-07**	**8.77E-15**	**2.41E-06**	**6.87E-08**	**2.10E-13**	**4.02E-11**	**7.55E-07**	**3.19E-03**	**0.00E+00**	**7.29E-06**	**3.55E-06**	**3.82E-05**	**3.24E-03**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	3.33E-15	1.47E-17	8.00E-21	1.13E-17	9.26E-17	5.24E-16	0.00E+00	4.77E-16	7.35E-17	1.06E-16	4.63E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	9.56E-14	3.09E-19	1.18E-16	9.10E-15	2.66E-15	9.94E-16	0.00E+00	1.37E-14	7.73E-15	6.38E-15	1.36E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.65E-15	7.04E-16	3.03E-18	3.42E-13	2.57E-15	1.45E-12	0.00E+00	1.74E-15	1.08E-15	4.92E-15	1.81E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.15E-13	5.70E-16	6.21E-19	1.26E-15	4.22E-14	2.89E-14	0.00E+00	1.82E-13	6.59E-16	1.62E-14	7.87E-13
	C-14	mSv/a	1.09E-11	8.76E-15	1.26E-07	4.88E-12	5.23E-13	1.38E-12	1.03E-10	2.90E-12	0.00E+00	6.88E-06	2.63E-06	4.40E-05	5.36E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	4.00E-12	0.00E+00	6.13E-15	0.00E+00	1.24E-14	0.00E+00	0.00E+00	7.65E-14	9.46E-12	9.06E-12	2.26E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	4.73E-14	5.21E-17	1.66E-17	1.63E-14	1.55E-17	3.23E-17	0.00E+00	2.13E-14	1.94E-12	1.89E-11	2.09E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-06	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.33E-20	0.00E+00	2.77E-23	0.00E+00	2.16E-22	0.00E+00	0.00E+00	3.83E-21	1.86E-21	2.14E-21	2.14E-20
	HTO	mSv/a	1.23E-07	0.00E+00	1.01E-06	5.72E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.27E-09	4.00E-07	1.57E-06	3.17E-06
	I-129	mSv/a	1.79E-13	9.89E-19	3.15E-10	1.17E-14	1.39E-13	4.27E-12	2.27E-11	4.99E-13	0.00E+00	1.81E-11	3.14E-11	1.63E-09	2.03E-09

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.64E-25	1.30E-25	5.70E-28	7.48E-23	7.36E-27	4.79E-24	0.00E+00	7.58E-25	3.85E-26	3.04E-28	8.08E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.27E-11	0.00E+00	4.81E-14	0.00E+00	5.20E-13	0.00E+00	0.00E+00	4.55E-12	4.39E-11	4.21E-11	1.14E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	2.50E-11	6.00E-15	3.53E-14	2.04E-11	4.09E-15	1.08E-14	0.00E+00	7.18E-12	2.01E-12	2.80E-13	5.49E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-09	7.26E-08	1.33E-07	2.09E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	5.87E-14	2.59E-18	1.27E-16	1.31E-14	5.19E-15	2.30E-15	0.00E+00	5.61E-15	1.00E-14	3.51E-16	9.54E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	5.75E-16	6.08E-17	3.73E-21	1.11E-16	5.09E-17	7.19E-15	0.00E+00	5.51E-17	2.28E-17	2.10E-18	8.07E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	8.43E-12	6.78E-18	1.04E-14	6.13E-14	1.80E-13	2.70E-16	0.00E+00	2.42E-10	1.10E-11	1.88E-11	2.81E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.20E-07	4.49E-16	3.99E-12	3.82E-15	2.56E-12	1.24E-17	0.00E+00	1.73E-07	7.05E-08	1.26E-07	4.90E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	2.51E-10	7.82E-17	5.34E-13	1.68E-13	9.86E-10	3.01E-13	0.00E+00	5.04E-08	1.73E-12	2.27E-12	5.17E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	6.09E-13	1.93E-19	1.29E-15	8.65E-16	2.39E-12	4.10E-16	0.00E+00	1.22E-10	4.19E-15	5.50E-15	1.25E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	4.85E-13	3.47E-16	1.33E-18	2.52E-16	5.87E-14	5.40E-14	0.00E+00	1.86E-14	1.18E-13	9.45E-14	8.29E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.74E-18	8.18E-21	1.53E-24	2.55E-21	2.11E-19	1.70E-18	0.00E+00	6.66E-20	1.69E-19	1.94E-19	4.10E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.64E-13	1.12E-17	9.46E-19	1.50E-16	3.20E-14	1.98E-14	0.00E+00	1.01E-14	7.62E-14	5.72E-14	4.59E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	8.15E-13	3.20E-16	1.76E-15	1.11E-12	9.87E-14	3.01E-13	0.00E+00	3.12E-14	7.79E-13	3.88E-13	3.53E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.62E-17	6.53E-21	1.25E-20	2.30E-18	3.17E-18	2.81E-18	0.00E+00	1.00E-18	1.87E-17	9.66E-18	6.38E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.22E-11	5.75E-15	3.03E-16	2.51E-15	1.82E-15	2.82E-16	0.00E+00	4.25E-12	1.59E-11	1.98E-11	6.22E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	2.71E-15	1.58E-17	1.22E-20	6.14E-17	8.43E-15	2.06E-13	0.00E+00	1.56E-16	8.95E-18	6.43E-17	2.18E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.19E-19	2.07E-22	3.61E-23	1.04E-19	6.80E-19	9.60E-18	0.00E+00	1.25E-20	1.54E-21	7.61E-21	1.06E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.20E-14	9.34E-18	1.56E-16	2.60E-14	2.24E-13	1.48E-13	0.00E+00	4.13E-15	1.13E-15	2.86E-15	4.79E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.36E-14	7.98E-20	1.16E-16	4.36E-15	1.67E-13	2.95E-14	0.00E+00	3.08E-15	8.42E-16	2.13E-15	2.60E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	1.14E-16	1.05E-18	2.91E-23	3.97E-18	3.54E-16	2.24E-13	0.00E+00	6.53E-18	3.52E-20	7.42E-19	2.25E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	4.20E-19	5.87E-25	9.11E-22	2.25E-18	1.31E-18	1.56E-17	0.00E+00	2.41E-20	6.61E-21	1.67E-20	1.96E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	7.87E-15	3.01E-17	4.56E-20	2.14E-16	2.45E-14	1.16E-13	0.00E+00	4.52E-16	2.96E-17	2.02E-16	1.49E-13
	U-233	mSv/a	0.00E+00	0.00E+00	1.31E-12	5.70E-18	2.61E-15	1.92E-14	1.08E-15	2.70E-17	0.00E+00	1.21E-14	1.19E-13	2.71E-12	4.17E-12
	U-234	mSv/a	0.00E+00	0.00E+00	3.92E-12	7.92E-18	7.80E-15	1.85E-14	3.21E-15	5.49E-18	0.00E+00	3.60E-14	3.56E-13	8.08E-12	1.24E-11
	U-235	mSv/a	0.00E+00	0.00E+00	1.53E-12	3.32E-15	3.05E-15	2.00E-12	1.26E-15	3.74E-15	0.00E+00	1.41E-14	1.39E-13	3.16E-12	6.86E-12
	U-236	mSv/a	0.00E+00	0.00E+00	2.04E-12	2.79E-18	4.06E-15	8.75E-15	1.67E-15	1.63E-18	0.00E+00	1.87E-14	1.85E-13	4.20E-12	6.45E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.02E-11	1.28E-16	2.02E-14	1.04E-11	8.31E-15	4.27E-15	0.00E+00	9.33E-14	9.21E-13	2.09E-11	4.25E-11
	Total	**mSv/a**	**1.23E-07**	**8.77E-15**	**1.26E-06**	**5.72E-08**	**5.33E-12**	**4.02E-11**	**7.99E-06**	**3.19E-03**	**0.00E+00**	**7.11E-06**	**3.17E-06**	**4.58E-05**	**3.25E-03**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.63E-18	2.96E-20	1.46E-17	3.42E-16	6.81E-16	0.00E+00	5.54E-16	1.01E-16	2.35E-16	1.93E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.65E-20	2.70E-16	1.18E-14	6.10E-15	1.29E-15	0.00E+00	9.88E-15	6.37E-15	8.69E-15	4.44E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.74E-16	8.61E-18	4.45E-13	7.28E-15	1.89E-12	0.00E+00	1.55E-15	1.14E-15	1.27E-14	2.36E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.30E-18	1.63E-15	1.56E-13	3.76E-14	0.00E+00	2.12E-13	9.10E-16	3.16E-14	4.41E-13
	C-14	mSv/a	7.42E-12	8.76E-15	0.00E+00	9.29E-13	1.16E-12	1.38E-12	2.29E-10	2.90E-12	0.00E+00	4.79E-06	2.17E-06	6.90E-05	7.60E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.89E-14	3.71E-12	9.91E-12	1.37E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.92E-18	6.12E-17	1.63E-14	5.69E-17	3.23E-17	0.00E+00	2.46E-14	2.21E-12	6.26E-11	6.49E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.94E-23	0.00E+00	5.43E-22	0.00E+00	0.00E+00	3.02E-21	1.58E-21	2.80E-21	8.01E-21
	HTO	mSv/a	8.46E-08	0.00E+00	0.00E+00	1.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-09	3.26E-07	3.28E-06	3.71E-06
	I-129	mSv/a	6.80E-14	1.29E-18	0.00E+00	2.90E-15	1.78E-13	5.55E-12	2.92E-11	6.48E-13	0.00E+00	7.30E-12	1.43E-11	1.86E-09	1.91E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.22E-26	1.80E-27	9.73E-23	2.33E-26	6.23E-24	0.00E+00	7.54E-25	4.10E-26	4.87E-28	1.04E-22
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-10	1.71E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	7.48E-14	2.65E-11	8.67E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	2.89E-13	3.32E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-09	5.13E-08	2.17E-07	2.71E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.41E-19	1.98E-16	1.71E-14	8.13E-15	2.99E-15	0.00E+00	2.76E-15	5.23E-15	4.39E-16	3.68E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.02E-18	9.79E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	2.61E-11	1.94E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	1.50E-11	4.96E-15	9.63E-12	1.61E-17	0.00E+00	2.04E-07	9.84E-08	1.98E-07	5.00E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.94E-17	9.21E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	3.60E-12	2.90E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.79E-20	2.23E-15	1.12E-15	4.13E-12	5.32E-16	0.00E+00	6.63E-11	2.67E-15	8.72E-15	7.04E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.59E-17	3.61E-18	3.27E-16	1.59E-13	7.02E-14	0.00E+00	1.58E-14	1.19E-13	2.10E-13	5.75E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	4.54E-19	3.51E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	2.52E-18	1.95E-16	8.52E-14	2.57E-14	0.00E+00	8.45E-15	7.55E-14	1.25E-13	3.20E-13

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	2.34E-15	1.45E-12	1.31E-13	3.93E-13	0.00E+00	1.30E-14	3.65E-13	4.22E-13	2.78E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	1.28E-17	3.62E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.24E-15	2.51E-15	7.46E-15	2.82E-16	0.00E+00	5.47E-12	2.39E-11	5.40E-11	8.34E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.90E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	1.34E-16	2.97E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	1.27E-20	1.45E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.78E-16	3.22E-15	6.34E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	2.54E-15	3.65E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.91E-13	0.00E+00	7.69E-18	4.90E-20	1.84E-18	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	1.81E-20	2.55E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	4.64E-16	2.43E-13
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.51E-17	0.00E+00	7.55E-15	8.40E-14	4.26E-12	4.38E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	1.52E-14	2.41E-14	6.26E-15	7.14E-18	0.00E+00	2.20E-14	2.46E-13	1.24E-11	1.27E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	5.07E-12	7.79E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.83E-12	7.00E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.23E-11	4.66E-11
	Total	**mSv/a**	**8.46E-08**	**8.77E-15**	**0.00E+00**	**1.50E-08**	**1.76E-11**	**5.19E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**5.03E-06**	**2.65E-06**	**7.27E-05**	**4.23E-03**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	7.26E-15	3.63E-18	2.96E-20	1.46E-17	3.42E-16	6.81E-16	0.00E+00	5.54E-16	1.01E-16	7.56E-17	9.03E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.29E-13	7.65E-20	2.70E-16	1.18E-14	6.10E-15	1.29E-15	0.00E+00	9.88E-15	6.37E-15	2.84E-15	1.68E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.76E-15	1.74E-16	8.61E-18	4.45E-13	7.28E-15	1.89E-12	0.00E+00	1.55E-15	1.14E-15	3.70E-16	2.35E-12
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.13E-12	1.41E-16	2.30E-18	1.63E-15	1.56E-13	3.76E-14	0.00E+00	2.12E-13	9.10E-16	1.23E-14	1.55E-12
	C-14	mSv/a	7.42E-12	8.76E-15	1.65E-07	9.29E-13	1.16E-12	1.38E-12	2.29E-10	2.90E-12	0.00E+00	4.79E-06	2.17E-06	1.20E-05	1.91E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.83E-12	0.00E+00	7.36E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.89E-14	3.71E-12	2.10E-13	6.81E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.03E-13	9.92E-18	6.12E-17	1.63E-14	5.69E-17	3.23E-17	0.00E+00	2.46E-14	2.21E-12	1.89E-12	4.25E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.98E-20	0.00E+00	6.94E-23	0.00E+00	5.43E-22	0.00E+00	0.00E+00	3.02E-21	1.58E-21	1.10E-21	2.61E-20
	HTO	mSv/a	8.46E-08	0.00E+00	1.41E-06	1.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-09	3.26E-07	1.28E-07	1.96E-06
	I-129	mSv/a	6.80E-14	1.29E-18	2.39E-10	2.90E-15	1.78E-13	5.55E-12	2.92E-11	6.48E-13	0.00E+00	7.30E-12	1.43E-11	6.03E-11	3.56E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.93E-25	3.22E-26	1.80E-27	9.73E-23	2.33E-26	6.23E-24	0.00E+00	7.54E-25	4.10E-26	1.95E-28	1.05E-22
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.59E-11	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-11	1.14E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	3.12E-11	1.49E-15	7.48E-14	2.65E-11	8.67E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	1.26E-13	6.43E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-09	5.13E-08	3.65E-08	9.03E-08
	Pa-231	mSv/a	0.00E+00	0.00E+00	5.43E-14	6.41E-19	1.98E-16	1.71E-14	8.13E-15	2.99E-15	0.00E+00	2.76E-15	5.23E-15	4.24E-17	9.07E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.23E-15	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.11E-19	1.10E-14
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.05E-11	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	5.65E-12	1.84E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	2.67E-07	1.11E-16	1.50E-11	4.96E-15	9.63E-12	1.61E-17	0.00E+00	2.04E-07	9.84E-08	9.86E-08	6.68E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	2.56E-10	1.94E-17	9.21E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	7.41E-14	2.93E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	6.20E-13	4.79E-20	2.23E-15	1.12E-15	4.13E-12	5.32E-16	0.00E+00	6.63E-11	2.67E-15	1.80E-16	7.10E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	7.76E-13	8.59E-17	3.61E-18	3.27E-16	1.59E-13	7.02E-14	0.00E+00	1.58E-14	1.19E-13	1.43E-14	1.15E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.89E-18	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	2.79E-20	5.97E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.15E-13	2.78E-18	2.52E-18	1.95E-16	8.52E-14	2.57E-14	0.00E+00	8.45E-15	7.55E-14	8.60E-15	6.18E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	6.40E-13	7.92E-17	2.34E-15	1.45E-12	1.31E-13	3.93E-13	0.00E+00	1.30E-14	3.65E-13	2.92E-14	3.02E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.50E-17	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	9.08E-19	4.94E-17
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.37E-11	1.10E-15	1.24E-15	2.51E-15	7.46E-15	2.82E-16	0.00E+00	5.47E-12	2.39E-11	9.61E-12	9.27E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	5.40E-15	3.90E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	3.48E-17	3.02E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	3.53E-19	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	3.39E-21	1.48E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.60E-14	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.78E-16	7.90E-16	7.08E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.99E-14	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	6.23E-16	4.23E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	2.52E-16	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.91E-13	0.00E+00	7.69E-18	4.90E-20	3.84E-19	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	4.27E-19	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	4.44E-21	2.59E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	1.74E-14	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	1.22E-16	2.60E-13
	U-233	mSv/a	0.00E+00	0.00E+00	1.54E-12	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.51E-17	0.00E+00	7.55E-15	8.40E-14	4.19E-13	2.09E-12
	U-234	mSv/a	0.00E+00	0.00E+00	4.51E-12	1.96E-18	1.52E-14	2.41E-14	6.26E-15	7.14E-18	0.00E+00	2.20E-14	2.46E-13	1.22E-12	6.05E-12
	U-235	mSv/a	0.00E+00	0.00E+00	1.84E-12	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	4.98E-13	5.06E-12

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-236	mSv/a	0.00E+00	0.00E+00	2.48E-12	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.72E-13	3.32E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.17E-11	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.18E-12	2.91E-11
	Total	**mSv/a**	**8.46E-08**	**8.77E-15**	**1.84E-06**	**1.50E-08**	**1.76E-11**	**5.19E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**5.03E-06**	**2.65E-06**	**1.23E-05**	**4.18E-03**

Table D-24: Estimated Radiation Dose for On-site Farm Resident 3 Month Old During Post-Closure WRDF Failure

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.63E-18	4.71E-20	1.46E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.94E-17	8.77E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.65E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-15	1.93E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.74E-16	5.36E-18	4.45E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-16	4.46E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-14	1.60E-14
	C-14	mSv/a	3.12E-12	8.76E-15	0.00E+00	9.29E-13	6.32E-13	1.38E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-04	5.49E-04
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-11	1.00E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.92E-18	5.93E-17	1.63E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-11	3.84E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-06	1.46E-06
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.33E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-21	2.06E-21
	HTO	mSv/a	4.67E-08	0.00E+00	0.00E+00	1.21E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-06	6.88E-06
	I-129	mSv/a	2.43E-14	1.29E-18	0.00E+00	2.90E-15	9.08E-14	5.55E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.04E-10	9.09E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.22E-26	1.74E-27	9.73E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-27	9.73E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-12	8.73E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.45E-14	2.70E-11
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-07	2.63E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.41E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-11	5.00E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	2.76E-11	4.96E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-08	9.76E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.94E-17	5.74E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-11	4.68E-11
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.79E-20	1.39E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-14	1.14E-13
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.59E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-14	3.42E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-20	9.31E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	9.28E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-14	2.36E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	7.14E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-14	1.51E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-18	4.92E-18
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.61E-15	2.51E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-11	1.91E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.90E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.18E-17	1.36E-16
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.95E-21	1.44E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-15	3.77E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-15	8.39E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.72E-19	6.30E-18
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-21	2.94E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E-17	3.49E-16
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	8.80E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-14	7.80E-14
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	2.70E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-13	1.86E-13
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-14	2.67E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-14	9.58E-14
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-13	1.39E-11
	Total	**mSv/a**	**4.67E-08**	**8.77E-15**	**0.00E+00**	**1.21E-08**	**3.49E-11**	**5.19E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**5.58E-04**	**5.58E-04**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	2.48E-14	3.63E-18	4.71E-20	1.46E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.84E-12	7.65E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-12
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.69E-15	1.74E-16	5.36E-18	4.45E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.49E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.33E-12	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-12
	C-14	mSv/a	3.12E-12	8.76E-15	1.93E-07	9.29E-13	6.32E-13	1.38E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	8.74E-12	0.00E+00	1.06E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	2.13E-13	9.92E-18	5.93E-17	1.63E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-13
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.64E-19	0.00E+00	4.33E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-19
	HTO	mSv/a	4.67E-08	0.00E+00	2.48E-06	1.21E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-06
	I-129	mSv/a	2.43E-14	1.29E-18	2.61E-10	2.90E-15	9.08E-14	5.55E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-10

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.02E-24	3.22E-26	1.74E-27	9.73E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.83E-23
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.15E-10	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	3.97E-10	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-10
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	7.80E-13	6.41E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.57E-15	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.73E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	3.26E-11	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	1.05E-06	1.11E-16	2.76E-11	4.96E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	3.41E-09	1.94E-17	5.74E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-09
	Pu-240	mSv/a	0.00E+00	0.00E+00	8.28E-12	4.79E-20	1.39E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-12
	Ra-223	mSv/a	0.00E+00	0.00E+00	4.99E-12	8.59E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.58E-17	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-17
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.28E-12	2.78E-18	9.28E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	4.18E-12	7.92E-17	7.14E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.78E-16	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-16
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.49E-10	1.10E-15	1.61E-15	2.51E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	3.09E-14	3.90E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	4.71E-18	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	1.12E-12	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-12
	Th-230	mSv/a	0.00E+00	0.00E+00	8.00E-13	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	5.24E-16	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.30E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	5.83E-18	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	3.72E-14	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-14
	U-233	mSv/a	0.00E+00	0.00E+00	5.60E-12	1.41E-18	8.80E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.63E-12
	U-234	mSv/a	0.00E+00	0.00E+00	1.71E-11	1.96E-18	2.70E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-11
	U-235	mSv/a	0.00E+00	0.00E+00	6.61E-12	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-12
	U-236	mSv/a	0.00E+00	0.00E+00	8.91E-12	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-12
	U-238	mSv/a	0.00E+00	0.00E+00	4.44E-11	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-11
	Total	**mSv/a**	**4.67E-08**	**8.77E-15**	**3.73E-06**	**1.21E-08**	**3.49E-11**	**5.19E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**3.79E-06**

Table D-25: Estimated Radiation Dose for Ecological Receptors during Post-Closure WRDF Failure

Radionuclide	Unit	Barn Swallow	Little Brown Bat	Carmine Shiner	Lake Sturgeon	Walleye	Freshwater plant	Benthic Invertebrate	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Mink	Moose
Ac-225	mGy/d	7.75E-14	1.15E-18	2.34E-14	2.34E-14	2.33E-14	5.13E-12	1.20E-12	3.16E-14	1.59E-13	8.58E-14	4.99E-16	6.94E-15
Ac-227	mGy/d	2.03E-16	3.02E-21	6.11E-17	6.11E-17	6.10E-17	1.34E-14	3.13E-15	1.67E-16	5.01E-16	3.09E-16	8.92E-17	1.82E-17
Ag-108m	mGy/d	2.28E-15	9.40E-20	2.34E-13	2.34E-13	1.15E-15	8.39E-17	1.11E-12	1.28E-13	1.27E-13	1.27E-13	1.33E-13	4.50E-16
Bi-210	mGy/d	3.28E-14	4.25E-17	2.52E-13	2.52E-13	2.31E-13	6.04E-14	3.27E-12	2.35E-14	1.11E-14	1.15E-14	8.29E-15	5.06E-15
C-14	mGy/d	8.11E-06	6.68E-06	4.04E-06	4.04E-06	4.04E-06	4.19E-06	3.65E-06	8.11E-06	8.17E-06	8.15E-06	6.68E-06	7.04E-06
Ca-41	mGy/d	6.53E-15	1.56E-17	4.23E-15	4.23E-15	4.20E-15	7.46E-13	4.90E-13	2.61E-15	4.82E-15	3.22E-15	1.72E-15	1.16E-14
Cl-36	mGy/d	9.93E-14	5.91E-17	2.94E-14	2.94E-14	2.94E-14	2.89E-14	6.17E-14	4.80E-14	1.71E-14	2.27E-14	1.03E-14	6.36E-14
Cs-137	mGy/d	0.00E+00	0.00E+00	1.10E-04	1.10E-04	0.00E+00	0.00E+00	5.73E-04	1.47E-04	1.45E-04	1.43E-04	1.48E-04	3.16E-06
Gd-152	mGy/d	3.84E-20	5.65E-24	1.48E-20	1.48E-20	1.48E-20	2.47E-18	4.95E-19	1.56E-20	9.19E-20	4.85E-20	2.89E-21	5.14E-20
HTO	mGy/d	2.25E-08	2.34E-08	2.78E-08	2.78E-08	2.78E-08	2.78E-08	2.79E-08	2.25E-08	2.25E-08	2.25E-08	2.34E-08	3.80E-08
I-129	mGy/d	6.66E-16	4.20E-16	5.02E-13	5.02E-13	6.79E-14	7.21E-13	3.57E-12	7.25E-12	7.25E-12	7.25E-12	8.07E-13	1.05E-13
Nb-94	mGy/d	5.30E-29	3.21E-33	1.61E-24	1.61E-24	7.81E-25	1.74E-24	3.96E-24	1.05E-24	1.05E-24	1.05E-24	1.05E-24	2.54E-29
Ni-59	mGy/d	2.63E-12	3.73E-15	2.80E-12	2.80E-12	2.75E-12	6.69E-12	1.71E-11	1.30E-12	7.44E-13	7.64E-13	4.24E-13	6.32E-13
Np-237	mGy/d	1.63E-12	2.15E-15	2.97E-11	2.97E-11	2.97E-11	1.88E-09	8.21E-10	6.57E-13	1.80E-12	1.08E-12	9.05E-13	7.45E-12
OBT	mGy/d	1.52E-09	1.94E-09	5.19E-09	5.19E-09	5.19E-09	4.08E-09	5.21E-09	1.52E-09	1.51E-09	1.51E-09	1.94E-09	2.58E-09
Pa-231	mGy/d	3.72E-17	1.83E-20	2.96E-15	2.96E-15	2.91E-15	8.72E-14	2.91E-14	3.16E-16	3.53E-16	3.29E-16	3.10E-16	1.15E-17
Pa-233	mGy/d	8.27E-19	3.83E-22	1.34E-15	1.34E-15	6.82E-17	1.29E-15	7.18E-15	6.43E-16	6.43E-16	6.43E-16	6.84E-16	3.59E-19
Pb-210	mGy/d	7.94E-14	1.07E-17	5.29E-13	5.29E-13	5.29E-13	1.54E-14	7.84E-14	1.38E-13	6.89E-15	1.51E-14	8.03E-14	2.66E-15
Po-210	mGy/d	1.48E-07	8.94E-12	3.42E-09	3.42E-09	3.42E-09	1.01E-07	3.88E-07	6.16E-08	1.87E-08	3.06E-08	9.70E-09	7.70E-10
Pu-239	mGy/d	1.87E-12	2.74E-17	9.17E-08	9.17E-08	9.17E-08	1.75E-08	3.19E-09	1.73E-11	6.61E-12	3.89E-12	1.64E-12	2.62E-13
Pu-240	mGy/d	4.60E-15	6.75E-20	2.26E-10	2.26E-10	2.26E-10	4.30E-11	7.75E-12	4.27E-14	1.65E-14	9.79E-15	4.24E-15	6.44E-16
Ra-223	mGy/d	4.57E-13	2.54E-16	1.14E-13	1.14E-13	1.05E-13	3.13E-11	2.36E-11	1.97E-13	3.05E-13	2.15E-13	1.31E-13	5.74E-13
Ra-224	mGy/d	2.98E-18	1.66E-21	1.05E-18	1.05E-18	6.84E-19	2.04E-16	1.55E-16	1.44E-18	2.14E-18	1.55E-18	1.01E-18	3.74E-18
Ra-225	mGy/d	6.43E-13	3.57E-16	1.57E-13	1.57E-13	1.47E-13	4.41E-11	3.32E-11	2.78E-13	4.29E-13	3.03E-13	1.85E-13	8.08E-13
Ra-226	mGy/d	3.94E-13	2.21E-16	1.48E-13	1.48E-13	9.28E-14	2.68E-11	2.03E-11	2.26E-13	3.19E-13	2.41E-13	1.75E-13	4.98E-13
Ra-228	mGy/d	6.67E-21	3.41E-24	1.95E-19	1.95E-19	2.03E-21	3.31E-19	1.23E-18	2.73E-19	2.75E-19	2.74E-19	2.72E-19	1.47E-20
Tc-99	mGy/d	4.08E-13	8.68E-16	3.17E-12	3.17E-12	3.17E-12	1.21E-12	1.38E-12	3.86E-13	1.59E-13	1.35E-13	4.59E-14	4.14E-14
Th-227	mGy/d	4.49E-16	8.28E-19	1.28E-14	1.28E-14	3.78E-15	1.39E-12	1.15E-13	2.01E-14	2.36E-14	2.09E-14	2.05E-14	4.90E-15
Th-228	mGy/d	3.08E-20	5.67E-23	1.36E-18	1.36E-18	2.59E-19	9.37E-17	1.62E-17	2.02E-18	2.25E-18	2.07E-18	2.17E-18	3.30E-19
Th-229	mGy/d	3.68E-16	6.77E-19	1.04E-14	1.04E-14	3.10E-15	1.15E-12	8.60E-14	1.07E-14	1.35E-14	1.13E-14	1.08E-14	3.96E-15
Th-230	mGy/d	6.82E-16	1.26E-18	5.82E-15	5.84E-15	5.76E-15	2.11E-12	1.07E-13	4.17E-15	9.38E-15	5.35E-15	3.50E-15	7.33E-15
Th-231	mGy/d	1.81E-18	3.34E-21	1.57E-15	1.57E-15	1.54E-17	5.37E-15	1.70E-14	2.57E-14	2.57E-14	2.57E-14	2.68E-14	2.01E-17
Th-232	mGy/d	3.83E-21	7.05E-24	3.26E-20	3.26E-20	3.22E-20	1.16E-17	5.89E-19	2.35E-20	5.27E-20	3.01E-20	1.97E-20	4.10E-20
Th-234	mGy/d	6.02E-17	1.11E-19	5.00E-14	5.00E-14	5.12E-16	1.36E-13	2.38E-12	2.44E-14	2.49E-14	2.45E-14	2.57E-14	6.44E-16
U-233	mGy/d	3.99E-12	1.66E-16	7.17E-14	7.17E-14	7.17E-14	8.22E-11	8.22E-12	1.59E-12	1.91E-11	9.47E-12	8.38E-15	3.37E-13
U-234	mGy/d	1.24E-11	5.15E-16	2.22E-13	2.22E-13	2.22E-13	2.55E-10	2.59E-11	4.93E-12	5.91E-11	2.94E-11	2.60E-14	1.04E-12
U-235	mGy/d	4.67E-12	1.94E-16	8.48E-14	8.48E-14	8.41E-14	9.61E-11	9.82E-12	1.86E-12	2.23E-11	1.11E-11	1.07E-14	3.98E-13
U-236	mGy/d	6.43E-12	2.68E-16	1.15E-13	1.15E-13	1.15E-13	1.32E-10	1.32E-11	2.56E-12	3.07E-11	1.52E-11	1.35E-14	5.42E-13
U-238	mGy/d	3.06E-11	1.28E-15	5.50E-13	5.50E-13	5.50E-13	6.30E-10	6.26E-11	1.22E-11	1.46E-10	7.27E-11	6.43E-14	2.58E-12
Total	**mGy/d**	**8.28E-06**	**6.70E-06**	**1.14E-04**	**1.14E-04**	**4.17E-06**	**4.34E-06**	**5.77E-04**	**1.55E-04**	**1.53E-04**	**1.52E-04**	**1.54E-04**	**1.02E-05**

Table D-26: Release Time Period and Corresponding Flowrate with WRDF Failure

Time (yr)	Pathway Flow (m^3/d)
0	0.178
500	0.187
1000	0.199
2000	0.223
5000	0.211
10000 or more	0.209

Note: Flowrates are obtained from Scenario 3 in Table 5-4 in Golder, 2021.

Table D-27: Exposure Point Concentrations for Non-Radionuclides for during Post-Closure with WRDF Failure

Non-radionuclide	Groundwater Concentration (µg/L)	Background Concentration (µg/L)	Project Contribution to River Concentrations at Groundwater Seep at River Bottom (µg/L)	River Concentration at Groundwater Seep at River Bottom (µg/L)	Project Contribution to River Concentrations at Groundwater Seep - 50 m Downstream (µg/L)	River Concentration at Groundwater Seep - 50 m Downstream (µg/L)	Project Contribution to River Concentration at Farm A Intake (µg/L)	River Concentration at Farm A Intake (µg/L)
Cadmium	4.86E+00	1.00E-02	3.59E-05	1.00E-02	4.15E-06	1.00E-02	7.80E-08	1.00E-02
HB-40	5.41E+02	0.00E+00	4.00E-03	4.00E-03	4.61E-04	4.61E-04	8.68E-06	8.68E-06
Lead	6.74E+01	2.60E+00	4.98E-04	2.60E+00	5.75E-05	2.60E+00	1.08E-06	2.60E+00
Xylene	7.06E+01	NV	4.44E-04	4.44E-04	5.13E-05	5.13E-05	9.65E-07	9.65E-07

Table D-28: Doses for Non-Radionuclides to Harvester during Post-Closure with WRDF Failure

Human Type	Non-radionuclide	Unit	Dose by Pathway				Total
			Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of WeeKay	
Adult	Cd	mg/kg bw/day	1.40E-07	6.09E-07	1.45E-05	2.94E-06	1.82E-05
	Pb	mg/kg bw/day	6.48E-06	1.13E-05	2.63E-05	2.02E-04	2.46E-04
Toddler	Cd	mg/kg bw/day	1.46E-07	3.93E-07	9.35E-06	4.14E-06	1.40E-05
	Pb	mg/kg bw/day	6.79E-06	7.28E-06	1.70E-05	1.08E-04	1.39E-04

Table D-29: Doses for Non-Radionuclides to On-site Farm during Post-Closure with WRDF Failure

Human Type	Non-radionuclide	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cd	mg/kg bw/day	7.73E-05	1.22E-09	6.98E-11	7.72E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	7.74E-05
	Pb	mg/kg bw/day	2.01E-02	1.50E-07	8.58E-08	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	2.01E-02
Toddler	Cd	mg/kg bw/day	1.32E-04	2.10E-08	1.36E-10	1.65E-09	2.48E-09	1.17E-07	1.04E-09	6.73E-09	5.01E-09	2.08E-09	7.51E-09	0.00E+00	1.33E-04
	Pb	mg/kg bw/day	3.44E-02	2.58E-06	1.67E-07	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.44E-02
WRDF Barrier Failure Contribution (Dose by Pathway)															
Adult	Cd	mg/kg bw/day	3.20E-08	5.08E-13	2.90E-14	3.20E-13	9.79E-13	4.63E-11	1.04E-12	3.06E-12	2.74E-12	1.82E-12	3.76E-13	1.83E-14	3.21E-08
	Pb	mg/kg bw/day	4.44E-07	1.63E-13	9.30E-14	1.03E-13	9.32E-14	1.15E-10	1.54E-12	2.60E-11	8.75E-13	1.29E-11	4.74E-12	2.60E-14	4.44E-07
Toddler	Cd	mg/kg bw/day	5.49E-08	8.71E-12	5.65E-14	6.87E-13	1.03E-12	4.86E-11	4.31E-13	2.79E-12	2.08E-12	8.61E-13	3.11E-12	0.00E+00	5.50E-08
	Pb	mg/kg bw/day	7.61E-07	2.80E-12	1.81E-13	2.21E-13	9.81E-14	1.20E-10	6.34E-13	2.37E-11	6.65E-13	6.10E-12	3.92E-11	0.00E+00	7.61E-07

Table D-30: Doses for Non-Radionuclides to Farm A during Post-Closure with WRDF Failure

Human Type	Non-radionuclide	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cd	mg/kg bw/day	7.72E-05	1.22E-09	6.98E-11	7.72E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	7.74E-05
	Pb	mg/kg bw/day	8.35E-09	1.50E-07	8.58E-08	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	4.85E-07
Toddler	Cd	mg/kg bw/day	1.32E-04	2.10E-08	1.36E-10	1.65E-09	2.48E-09	1.17E-07	1.04E-09	6.72E-09	5.01E-09	2.07E-09	7.50E-09	0.00E+00	1.33E-04
	Pb	mg/kg bw/day	1.43E-08	2.58E-06	1.67E-07	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.14E-06
WRDF Barrier Failure Contribution (Dose by Pathway)															
Adult	Cd	mg/kg bw/day	6.03E-10	9.55E-15	6.77E-15	6.02E-15	1.84E-14	8.71E-13	1.96E-14	5.76E-14	5.15E-14	3.42E-14	7.07E-15	3.44E-16	6.04E-10
	Pb	mg/kg bw/day	8.35E-09	3.07E-15	1.75E-15	1.93E-15	1.75E-15	2.16E-12	2.89E-14	4.89E-13	1.65E-14	2.42E-13	8.91E-14	4.89E-16	8.35E-09
Toddler	Cd	mg/kg bw/day	1.03E-09	1.64E-13	1.06E-15	1.29E-14	1.94E-14	9.14E-13	8.10E-15	5.25E-14	3.91E-14	1.62E-14	5.86E-14	0.00E+00	1.03E-09
	Pb	mg/kg bw/day	1.43E-08	5.26E-14	3.41E-15	4.14E-15	1.84E-15	2.26E-12	1.19E-14	4.46E-13	1.25E-14	1.15E-13	7.38E-13	0.00E+00	1.43E-08

Table D-31: Doses for Non-Radionuclides for Birds and Mammals in Post-Closure with WRDF Failure

Non-radionuclide	Unit	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose
Cadmium	mg/kg bw/day	1.07E-03	3.71E-04	1.97E-02	2.44E-02	4.97E-04	1.92E-04	1.82E-02
HB-40	mg/kg bw/day	1.09E+00	4.52E-01	2.77E-02	1.23E-01	5.19E-01	2.66E-01	2.55E-02
Lead	mg/kg bw/day	7.76E-02	2.42E-02	5.13E-01	6.38E-01	2.86E-02	1.14E-02	4.72E-01
Xylene	mg/kg bw/day	2.06E-04	7.22E-05	1.23E-05	3.19E-05	9.76E-05	3.78E-05	1.13E-05

4.3 Risk Estimates

Total doses for radionuclides are presented in Table D-32 and Table D-33 for human and ecological receptors, respectively.

4.3.1 Radionuclides

All radionuclide doses were below the IAEA reference level (lower and upper level) ranging from 1 to 20 mSv/a.

The dominant pathway for both the On-Site Farm as well as for Farm A is Cs-137 through external exposure to sediment. This constitutes the measured background and is not associated with the disruptive scenario for the project. Omitting the dose due to Cs-137 in sediment, the highest contributor to the total dose is C-14 mainly through the consumption of terrestrial animals. For 3-month-old infants in both farm locations, the dominant uptake pathway is C-14 through breast milk for the nursing infant, and HTO from water for the formula consuming infant. In the case of the harvester the majority of the dose is accounted for by C-14 through uptake of terrestrial and aquatic animals.

While Table D-32 presents the results based on the conservative assumption that maximum loadings to the river occur at the same time for all COPCs, Figure D-2 shows a more realistic representation of predicted dose rate to human receptors after a hypothetical WRDF barrier failure. After a hypothetical barrier failure, the dose steadily increases with time, generally peaking around 1,000 years after closure due to contribution from carbon-14. The exception is the 3-month-old formula-fed infant where the dose peaks at the beginning of modelling and then again after 100,000 years. This is because the dose from tritium peaks towards the beginning of the modelling timeframe, and the dose from polonium-210 peaks after 100,000 years.

The dose to receptors in the WRDF barrier failure scenario is similar to the Normal Evolution scenario since the source inventory is the same, and in both situations the end point is the Winnipeg River. In the WRDF barrier failure scenario the groundwater pathway flowrate through the fracture is faster than in normal evolution; therefore, groundwater concentrations are lower than in normal evolution.

Table D-32: Summary of Total Dose for Post-Closure Human Receptors with WRDF Failure and Comparison to Limits

Age Group	Dose (mSv/a)					
	On-Site Farm		Farm A		Harvester	
	Total (including background Cs-137)	WRDF Barrier Failure only*	Total (including background Cs-137)	WRDF Barrier Failure only*	Total (including background Cs-137)	WRDF Barrier Failure only*
Adult	3.24E-03	5.17E-05	3.35E-04	9.71E-07	4.81E-05	3.07E-05
Child	3.25E-03	5.76E-05	3.36E-04	1.08E-06	3.09E-05	2.49E-05

Age Group	Dose (mSv/a)					
	On-Site Farm		Farm A		Harvester	
	Total (including background Cs-137)	WRDF Barrier Failure only*	Total (including background Cs-137)	WRDF Barrier Failure only*	Total (including background Cs-137)	WRDF Barrier Failure only*
Infant (nursing)	4.23E-03	8.05E-05	4.37E-04	1.51E-06	2.03E-05	1.79E-05
Infant (formula)	4.18E-03	2.19E-05	4.36E-04	4.12E-07	-	-
3 month old (nursing)	5.58E-04	5.56E-04	1.06E-05	1.05E-05	-	-
3 month old (formula)	3.79E-06	3.79E-06	7.12E-08	7.12E-08	-	-

Notes:
Bold cells indicate exceedance of the lower IAEA reference level of 1 mSv/a and shaded cells indicate exceedance of the upper IAEA reference level of 20 mSv/a.
*Project dose results exclude the existing background contribution from Cs-137 present in sediment.

All radionuclide doses to ecological receptors are well below the radiation dose benchmarks of 2.4 mGy/day for terrestrial biota and 9.6 mGy/day for aquatic biota. For receptors exposed to sediment (Lake Sturgeon, Carmine Shiner, Benthic Invertebrates, Horned Grebe, Trumpeter Swan, Wild Waterfowl and Mink) the dose is primarily due to existing Cs-137 in the river sediment, with C-14 being the next largest contributor to dose. For the remaining ecological receptors, the dominant pathway of exposure is C-14 through the food chain.

Table D-33: Summary of Total Dose for Post-Closure Ecological Receptors with WRDF Failure and Comparison to Dose Benchmarks

Ecological Receptor	Total (including background Cs-137) (mGy/day)	WRDF Barrier Failure only* (mGy/day)
Barn Swallow	8.28E-06	8.28E-06
Little Brown Bat	6.70E-06	6.70E-06
Carmine Shiner	1.14E-04	4.17E-06
Lake Sturgeon	1.14E-04	4.17E-06
Walleye	4.17E-06	4.17E-06
Freshwater plant	4.34E-06	4.34E-06
Benthic Invertebrate	5.77E-04	4.07E-06
Horned Grebe	1.55E-04	8.19E-06
Trumpeter Swan	1.53E-04	8.21E-06
Wild Waterfowl	1.52E-04	8.20E-06
Mink	1.54E-04	6.71E-06
Moose	1.02E-05	7.08E-06

Notes:
Bold and shaded cells indicate exceedance of the aquatic benchmark of 9.6 mGy/d or the terrestrial benchmark of 2.4 mGy/d.
*Project dose results exclude the existing background contribution from Cs-137 present in sediment.

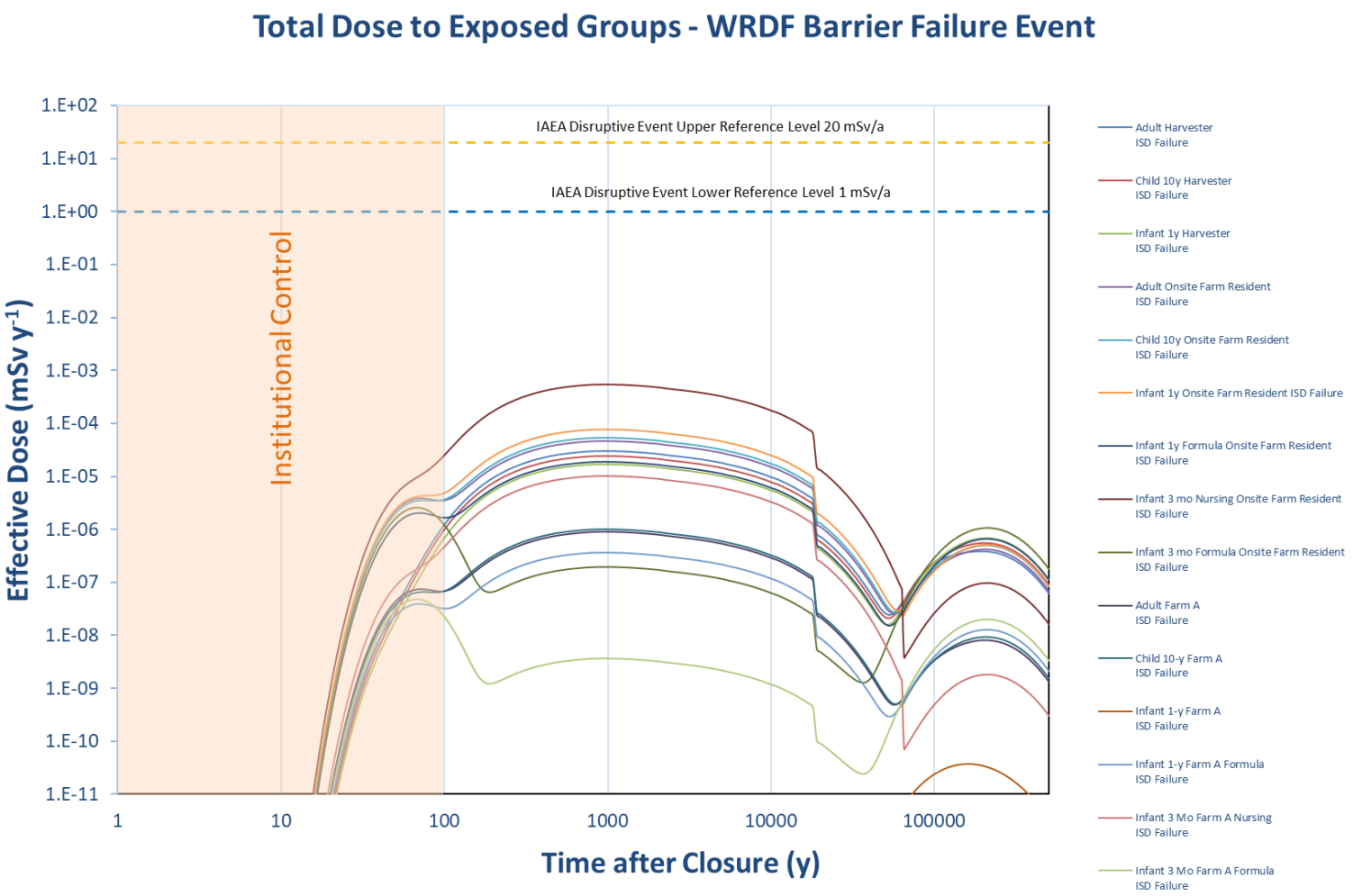

Figure D-2: Dose Rate to Human Receptors from Disruptive Events Scenario – WRDF Barrier Failure

4.3.2 Non-radionuclides

Non-radiological hazard quotients are presented in Table D-34, Table D-35, Table D-36, Table D-37, and Table D-38.

The HQs for the harvester are below the acceptable risk level of 0.2 for cadmium and lead for all ingestion pathways for the toddler and adult. The HQs for the On-site Farm and Farm A receptors are below the acceptable risk level of 0.2 for cadmium and lead for all pathways, with the exception of lead from drinking water from the Winnipeg River. The HQs for all receptors are based on background plus project exposure. If only the project contribution is considered, the HQs to the toddler and adult for the On-site Farm and Farm A are well below the acceptable risk level of 0.2. This indicates that the project contribution to the total HQ is negligible and the exceedance is from existing background concentrations of lead in the Winnipeg River. Therefore, adverse effects to human receptors are not anticipated from WRDF failure.

The HQs for the ecological receptors are below the acceptable risk level of 1.0 for cadmium, lead, HB-40 and xylene. Therefore, it is unlikely that there would be significant adverse effects on either aquatic or terrestrial populations or communities as a result of WRDF failure.

Table D-34: Hazard Quotients for Harvester During Post-Closure with WRDF Failure

Human Type	Non-radionuclide	Total River Contribution					WRDF Barrier Failure Contribution				
		Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of WeeKay	Total	Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of WeeKay	Total
Adult	Cadmium	1.40E-04	6.09E-04	1.45E-02	2.94E-03	1.82E-02	2.95E-08	1.29E-07	3.06E-06	6.22E-07	3.84E-06
	Lead	3.50E-03	6.10E-03	1.42E-02	1.09E-01	1.33E-01	3.94E-08	6.87E-08	1.60E-07	4.65E-07	7.34E-07
Toddler	Cadmium	1.46E-04	3.93E-04	9.35E-03	4.14E-03	1.40E-02	3.09E-08	8.30E-08	1.98E-06	8.75E-07	2.97E-06
	Lead	3.67E-03	3.93E-03	9.17E-03	5.82E-02	7.49E-02	4.13E-08	4.43E-08	1.03E-07	6.55E-07	8.44E-07

Notes: Bold and shaded values indicate HQ greater than 0.2.

Table D-35: Hazard Quotients for On-Site Farm Receptor During Post-Closure with WRDF Failure

Human Type	Non-radionuclide	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution														
Adult	Cadmium	7.73E-02	1.22E-06	6.98E-08	7.72E-07	2.36E-06	1.12E-04	2.52E-06	7.38E-06	6.60E-06	4.38E-06	9.06E-07	4.41E-08	7.74E-02
	Lead	**1.09E+01**	8.13E-05	4.64E-05	5.13E-05	4.64E-05	2.80E-03	3.87E-05	6.54E-04	2.18E-05	3.24E-04	1.18E-04	6.49E-07	**1.09E+01**
Toddler	Cadmium	1.32E-01	2.10E-05	1.36E-07	1.65E-06	2.48E-06	1.17E-04	1.04E-06	6.73E-06	5.01E-06	2.08E-06	7.51E-06	0.00E+00	1.33E-01
	Lead	**1.86E+01**	1.39E-03	9.04E-05	1.10E-04	4.89E-05	2.94E-03	1.60E-05	5.96E-04	1.66E-05	1.53E-04	9.81E-04	0.00E+00	**1.86E+01**
WRDF Barrier Failure Contribution														
Adult	Cadmium	3.20E-05	5.08E-10	2.90E-11	3.20E-10	9.79E-10	4.63E-08	1.04E-09	3.06E-09	2.74E-09	1.82E-09	3.76E-10	1.83E-11	3.21E-05
	Lead	2.40E-04	8.82E-11	5.03E-11	5.56E-11	5.04E-11	6.20E-08	8.31E-10	1.41E-08	4.73E-10	6.96E-09	2.56E-09	1.40E-11	2.40E-04
Toddler	Cadmium	5.49E-05	8.71E-09	5.65E-11	6.87E-10	1.03E-09	4.86E-08	4.31E-10	2.79E-09	2.08E-09	8.61E-10	3.11E-09	0.00E+00	5.50E-05
	Lead	4.11E-04	1.51E-09	9.81E-11	1.19E-10	5.30E-11	6.50E-08	3.43E-10	1.28E-08	3.60E-10	3.30E-09	2.12E-08	0.00E+00	4.11E-04

Notes: Bold and shaded values indicate HQ greater than 0.2.

Table D-36: Hazard Quotients for Farm A Receptor During Post-Closure with WRDF Failure

Human Type	Non-radionuclide	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution														
Adult	Cadmium	7.72E-02	1.22E-06	6.98E-08	7.72E-07	2.36E-06	1.12E-04	2.52E-06	7.38E-06	6.60E-06	4.38E-06	9.06E-07	4.41E-08	7.74E-02
	Lead	**1.09E+01**	8.13E-05	4.64E-05	5.13E-05	4.64E-05	2.80E-03	3.87E-05	6.54E-04	2.18E-05	3.24E-04	1.18E-04	6.49E-07	**1.09E+01**
Toddler	Cadmium	1.32E-01	2.10E-05	1.36E-07	1.65E-06	2.48E-06	1.17E-04	1.04E-06	6.72E-06	5.01E-06	2.07E-06	7.50E-06	0.00E+00	1.33E-01
	Lead	**1.86E+01**	1.39E-03	9.04E-05	1.10E-04	4.89E-05	2.94E-03	1.60E-05	5.96E-04	1.66E-05	1.53E-04	9.81E-04	0.00E+00	**1.86E+01**
WRDF Barrier Failure Contribution														
Adult	Cadmium	6.03E-07	9.55E-12	6.77E-12	6.02E-12	1.84E-11	8.71E-10	1.96E-11	5.76E-11	5.15E-11	3.42E-11	7.07E-12	3.44E-13	6.04E-07
	Lead	4.51E-06	1.66E-12	9.45E-13	1.05E-12	9.46E-13	1.17E-09	1.56E-11	2.64E-10	8.90E-12	1.31E-10	4.82E-11	2.64E-13	4.51E-06
Toddler	Cadmium	1.03E-06	1.64E-10	1.06E-12	1.29E-11	1.94E-11	9.14E-10	8.10E-12	5.25E-11	3.91E-11	1.62E-11	5.86E-11	0.00E+00	1.03E-06
	Lead	7.73E-06	2.84E-11	1.84E-12	2.24E-12	9.97E-13	1.22E-09	6.45E-12	2.41E-10	6.76E-12	6.20E-11	3.99E-10	0.00E+00	7.74E-06

Notes: Bold and shaded values indicate HQ greater than 0.2.

Table D-37: Hazard Quotients for Aquatic Receptors in Post-Closure with WRDF Failure

Non-radionuclide	Benthic Invertebrates	Fish	Aquatic Plants
Cadmium	6.69E-02	5.90E-03	5.02E-03
HB-40	2.00E-04	4.65E-06	8.50E-06
Lead	2.12E-01	1.38E-01	5.20E-03
Xylene	4.44E-06	1.66E-07	1.14E-07

Notes:
Bold and shaded values indicate a HQ > 1

Table D-38: Hazard Quotients for Birds and Mammals in Post-Closure with WRDF Failure

Non-radionuclide	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose
Cadmium	5.36E-05	1.85E-05	9.87E-04	1.22E-03	4.97E-05	1.92E-05	1.82E-03
HB-40	NV	NV	NV	NV	2.07E-03	1.06E-03	1.02E-04
Lead	6.87E-03	2.15E-03	4.54E-02	5.65E-02	3.58E-04	1.42E-04	5.90E-03
Xylene	3.68E-06	1.29E-06	2.19E-07	5.71E-07	2.73E-07	1.06E-07	3.16E-08

Notes:
Bold and shaded values indicate a HQ > 1
NV = no value available to calculate HQ.

4.4 Summary

Doses to human receptors from radionuclides in the WRDF barrier failure scenario are below the acceptable range of the IAEA reference level (1 to 20 mSv/a) for disruptive events. Considering only contributions from the WRDF, C-14 is the radionuclide with the greatest contribution to total dose.

For the non-radiological assessment, the HQs for all human receptors for cadmium and lead are below the acceptable risk level of 0.2 when considering impacts from the WRDF failure only.

All radionuclide doses to ecological receptors are well below the radiation dose benchmarks of 2.4 mGy/day for terrestrial biota and 9.6 mGy/day for aquatic biota. The HQs for the ecological receptors are below the acceptable risk level of 1.0 for cadmium, lead, HB-40 and xylene.

Overall, the effects from the WRDF barrier failure, where a preferential path to the Winnipeg River is created, results in a similar outcome as compared to the normal evolution scenario assessed in the ERA.

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