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The Risk Assessment Information System Compendium of Ecological Screening Benchmarks for Chemicals and Radionuclides (2025) (Volume I – Text, Radionuclides for all Media, Chemicals for Air and Biota)

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November 2025

OAK RIDGE National Laboratory

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Environmental Sciences Division

THE RISK ASSESSMENT INFORMATION SYSTEM COMPENDIUM OF ECOLOGICAL SCREENING BENCHMARKS FOR CHEMICALS AND RADIONUCLIDES (2025) (VOLUME 1 – TEXT, RADIONUCLIDES FOR ALL MEDIA, CHEMICALS FOR AIR AND BIOTA)

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ABSTRACT

The Risk Assessment Information System Ecological Benchmark Tool compiles screening level benchmark values for assessing potential ecological risks posed by chemical and radionuclide contaminants. Drawing from a wide array of federal, state, and international sources, it consolidates benchmarks across environmental media, including soil, water, sediment, air, and biota, and presents values for a broad range of receptors and exposure pathways.

The tool includes both effect-based and no-effect thresholds, with media- and organism-specific guidance derived from peer-reviewed literature and regulatory frameworks. By integrating diverse benchmark types into a unified reference, the tool supports consistent, scientifically grounded evaluations in ecological risk assessments and environmental management practices.

1. INTRODUCTION

The Risk Assessment Information System (RAIS) has been curating, compiling, and hosting ecological screening benchmarks since 2005. The results of this twenty-year effort are presented in this eight-volume compendium. Thirty benchmark sources provide ecological benchmarks for nine media classifications for thousands of chemical and radionuclide contaminants. The benchmarks are presented here in both table and chart format. Continue to consult the RAIS for updates to the sources that are still actively updated by their sponsors.

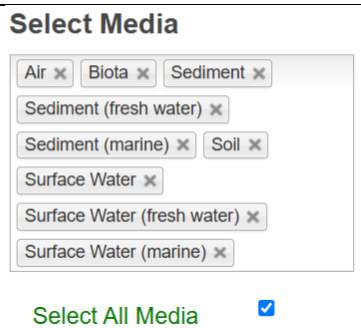
Volume I presents details about using the calculator, the benchmark sources, all radionuclide benchmarks, and chemical benchmarks for air and biota. Website navigation instructions are also presented.

2. USING THE ECOLOGICAL BENCHMARKS TOOL

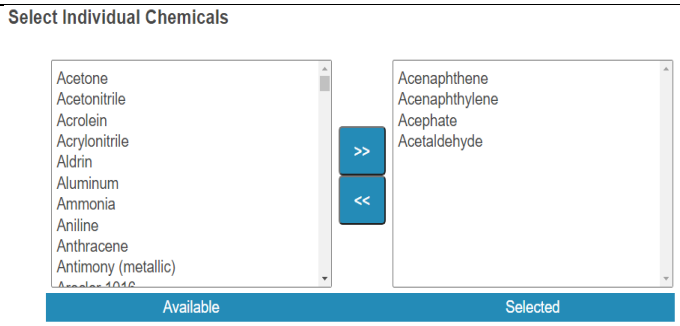
2.1 SELECT BENCHMARK SOURCES

Click in the "Select Benchmark Sources" box and select benchmark sources from the dropdown menu. Remove a benchmark source from the selection box by clicking the "×" next to its name. To grab every source at once, click the "Select All Benchmark Sources" checkbox.	

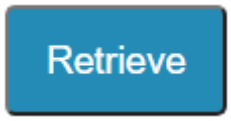
2.2 SELECT MEDIA

Click in the "Select Media" box and select the desired media from the dropdown menu. Remove media by clicking the "×" next to its name. To grab all media at once, click the "Select All Media" checkbox.	

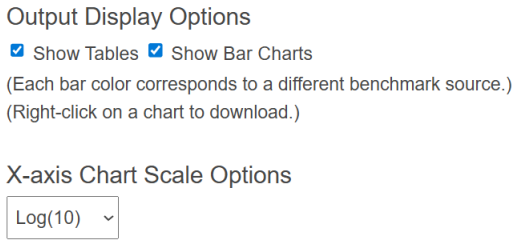
2.3 SELECT CONTAMINANTS

Select applicable contaminant(s) from the left-hand list and move them to the right-hand list by clicking the “>>” button. The tool will only query contaminants in the right-hand list. Multiple contaminants can be highlighted and moved over all at once. The tool has a limit of 50 contaminants per run.	

2.4 RETRIEVE RESULTS

Once sources, media, and contaminants have been selected, press the “Retrieve” button. Note that querying time scales with the number of options selected.	

2.5 REVIEW AND EXPORT RESULTS

Results initially display one or more tables. There is also an option to display results as a bar chart that consolidates the information. Result visualizations can be toggled by clicking either the “Show Tables” or “Show Bar Charts” checkboxes under “Output Display Options”. When displaying bar charts, results will be displayed in log(10) scaling. Switch to linear scaling by selecting the option from the dropdown menu under “X-axis Chart Scale Options”. Chart results are grouped by benchmark source and organism. Hovering over a specific bar will display a summary of the table results.	
Press the “Export” button to download the results to an Excel file.	

3. CHEMICAL SOURCES

3.1 AIR

3.1.1 Los Alamos National Laboratory (LANL) ECORISK Database – Release 4.4

The ECORISK Database, Version 4.4 (November 2024), is a screening tool developed by Los Alamos National Laboratory (LANL) to evaluate impacts from chemicals and radionuclides in soil, water, sediment, and air on the ecology at LANL. The ECORISK Database contains ecological screening levels (ESLs), which are media- and receptor-specific values that may be used to screen environmental data for ecological risk. Air (pore gas), soil, sediment, and water ESLs are calculated for receptors in various functional feeding guilds (carnivores, herbivores, insectivores, etc.) or selected from the peer-reviewed literature.

Media	Title
Air	Air No Effect ESL

See the Intellus New Mexico site here to download the database and associated files.

3.2 BIOTA

3.2.1 British Columbia Quality Guidelines

The spreadsheet at the source link provides all the approved, interim, and biota quality guidelines for British Columbia. These guidelines are generic provincial recommendations that are based on the most current scientific information available at the time of their derivation.

Media	Title
Biota	British Columbia Aquatic Life – Freshwater Dietary Tissue Long-Term Chronic
Biota	British Columbia Wildlife – Dietary Tissue Long-Term Chronic
Biota	British Columbia Wildlife – Dietary Tissue Long-Term Chronic

These values are all available from Water Quality Guidelines of B.C. Website values were accessed in July 2021.

3.2.2 Canadian Council of Ministers of the Environment (CCME) Tissue Residue Quality Guidelines

Media	Title
Biota	Protection of Wildlife – Consumer of Aquatic Biota

These values are all available from Canadian Council of the Environment. Website values were accessed in July 2021.

3.2.3 Environment and Climate Change Canada

This source includes all the approved, interim, and working biota quality guidelines for British Columbia (B.C.). These guidelines are generic provincial recommendations that are based on the most current

scientific information available at the time of their derivation. ECC Canada values are included in the B.C. data with a reference of Environment and Climate Change Canada.

Media	Title
Biota	Freshwater Long-Term Chronic Tissue
Biota	Marine Long-Term Chronic Tissue
Biota	Wildlife Dietary Long-Term Chronic Tissue

These values are available here. Website values were accessed in July 2021 (current as of March 2021).

3.2.4 New York Department of Environmental Conservation (DEC)

Provides noncarcinogenic and 1 in 100 cancer risk fish flesh criteria for the protection of piscivorous wildlife. Criteria were developed as part of the Niagara River Biota Contamination Project for New York State.

Media	Title
Biota	Non-Carcinogenic Final Fish Flesh Criteria
Biota	Carcinogenic Final Fish Flesh Criteria

These values are found in Table 26 of Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife, Authors: Arthur J. Newell, David W. Johnson, and Laurie K. Allen; NY DEC, Division of Fish and Wildlife; Technical Report 87-3; July 1987.

3.2.5 SETAC Environmental Contaminants in Wildlife

Tissue residue benchmarks were derived from the SETAC special publication "Environmental Contaminants in Wildlife Interpreting Tissue Concentrations", which is a series of chapters by individual authors discussing tissue residue-effects data for a variety of contaminants and taxonomic groups. Because chemicals may have a greater effect on or accumulate to a greater degree in specific tissues within an animal, recommended values are generally tissue-specific. Site tissue concentrations lower than these threshold values are not expected to cause significant adverse effects.

Media	Title
Biota	Avian Blood, Bone (dry weight), Brain, Carcass, Diet, Egg, Kidney, and Liver
Biota	Fish Brain, Egg, Muscle, and Whole Body
Biota	Mammal Blood, Fat, Kidney, and Liver

Beyer, W.N. , G.H. Heinz and A.W. Redmon-Norwood (eds.). 1996. Environmental Contaminants in Wildlife - Interpreting Tissue Concentrations, Special Publication of SETAC, CRC Press, Inc. 494 p.

3.3 SEDIMENT (INCLUSIVE OF ALL SEDIMENT TYPES)

3.3.1 British Columbia Sediment Quality Guidelines

This source provides all the approved, interim, and working sediment quality guidelines for British Columbia. These sediment guidelines are generic provincial recommendations that are based on the most current scientific information available at the time of their derivation.

Media	Title
Sediment	Aquatic Life Marine Sediment
Sediment	Freshwater Sediment Long-term Chronic

These values are all available here. Website values were accessed in July 2021.

3.3.2 Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines

Media	Title
Sediment	Freshwater ISQG
Sediment	Freshwater PEL
Sediment	Marine ISQG
Sediment	Marine PEL

These values are all available from Canadian Council of the Environment. Website values were accessed in July 2021.

3.3.3 Consensus-Based Sediment Quality Guidelines

Consensus-based Sediment Quality Guidelines (SQG) represent the geometric mean of published SQGs from a variety of sources. Sources for Probable Effect Concentrations (PEC) include probable effect levels, effect range median values, severe effect levels, and toxic effect thresholds (see MacDonald et al. 2000 for references). PECs are intended to identify contaminant concentrations above which harmful effects on sediment-dwelling organisms are expected to occur more often than not. Sources for Threshold Effect Concentrations (TEC) include threshold effect levels, effect range low values, lowest effect levels, minimal effect thresholds, and sediment quality advisory levels (see MacDonald et al. 2000 for references).

TECs are intended to identify contaminant concentrations below which harmful effects on sediment-dwelling organisms are not expected.

Media	Title
Sediment	Consensus-Based PEC
Sediment	Consensus-Based TEC

These values are available from MacDonald, D.D. , C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

3.3.4 Environment and Climate Change (ECC) Canada

This source includes all the approved, interim, and working sediment quality guidelines for British Columbia (B.C.). These quality guidelines are generic provincial recommendations that are based on the most current scientific information available at the time of their derivation. ECC Canada values are included in the B.C. data with a reference of Environment and Climate Change Canada.

Media	Title
Sediment	Freshwater Long-Term Chronic Sediment
Sediment	Marine Long-Term Chronic Sediment

These values are available here. Website values were accessed in July 2021 (current as of March 2021).

3.3.5 EPA ARCS

In support of the United States commitment to the Great Lakes Water Quality Agreement, Section 118 (c)(3) of the Clean Water Act authorized the USEPA Great Lakes National Program Office to carry out a 5-year study and demonstration project relating to the control and removal of toxic pollutants in sediments of the Great Lakes, called the Assessment and Remediation of Contaminated Sediment (ARCS) project. The representative effect concentration selected from among the high no-effect-concentrations (NEC) for Hyalella azteca and Chironomus riparius is a concentration above which statistically significant adverse biological effects always occur; effects may occur below these levels. The probable effect concentration (PEC) is the geometric mean of the 50th percentile in the effects data set and the 85th percentile in the no effects data set. It represents the lower limit of the range of concentrations usually associated with adverse effects. A concentration greater than the PEC is likely to result in adverse effects to these organisms.

The Threshold Effect Concentration (TEC) is the geometric mean of the 15th percentile in the effects data set and the 50th percentile in the no effects data set. It is a concentration that represents the upper limit of the range dominated by no effects data. Concentrations above the TEC may result in adverse effects to these organisms; concentrations below the TEC are unlikely to result in adverse effects. The majority of the data are for freshwater sediments.

Media	Title
Sediment	EPA ARCS – No Effect Concentration (NEC) (1996)
Sediment	EPA ARCS – Probable Effect Concentration (PEC) (1996)
Sediment	EPA ARCS – Threshold Effect Concentration (TEC) (1996)

These values are from Calculation and Evaluation of Sediment Effect Concentrations for the Amphipod Hyalella Azteca and the Midge Chironomus Riparius, EPA 905-R96-008, September 1996. They were located in Table 4 of Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revision, ES/ER/TM-95/R4.

3.3.6 EPA Equilibrium Partitioning Sediment Benchmarks (ESBS)

As a result of the need for a procedure to assist regulatory agencies in making decisions concerning contaminated sediment problems, the U.S. Environmental Protection Agency (EPA) Office of Science and Technology, Health and Ecological Criteria Division (OST/HECD) and Office of Research and Development National Health and Environmental Effects Research Laboratory (ORD/NHEERL) established a research team to review alternative approaches. The equilibrium partitioning (EqP) approach was selected for nonionic organic chemicals because it presented the greatest promise for generating defensible, national, numeric chemical-specific benchmarks applicable across a broad range of sediment types.

Media	Title
Sediment	ESBs-Effect Concentration of PAH in Sediment
Sediment	Maximum Solubility Limited PAH Concentration in Sediment

These values are available in Table 3-4 of Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures, EPA-600-R- 02-013, November 2003.

3.3.7 EPA OSWER

This Office of Emergency and Remedial Response (OSWER) Bulletin provides an overview of the development and use of Ecotox Threshold (ET) benchmark values in Superfund ecological risk assessments (ERAs). ETs are defined as media-specific contaminant concentrations above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation. The bulletin describes how ETs are to be used for screening purposes in the Superfund ERA process and summarizes the methodologies used to calculate ETs for each medium.

Media	Title
Sediment	Freshwater ISQG
Sediment	Freshwater PEL
Sediment	Marine ISQG
Sediment	Marine PEL

These values are from Table 2 in the Eco Update of the Ecotox Thresholds, Intermittent Bulletin Volume 3, Number 2; Office of Emergency and Remedial Response (OSWER), Publication 9345.0- 12FSI, EPA 540/F-95/038, PB95-963324, January 1996.

3.3.8 EPA Region 3 Sediment Screening Values

For Region 3, BTAG Screening Benchmarks are values used for evaluating sampling data at Superfund sites. These values facilitate consistency in screening level ecological risk assessments throughout Region 3. Additional toxicological information should be considered in Step 3 as provided by the Ecological Risk Assessment Guidance for Superfund (EPA, 1997).

Media	Title
Sediment	Freshwater Sediment BTAG
Sediment	Marine Sediment BTAG

The freshwater sediment values can be found here and marine sediment values here, 7/2006.

3.3.9 EPA Region 4 Sediment Screening Values

Media	Title
Sediment	Non-Narcotic Modes of Action - Freshwater Ecological Screening Value for Step 2 (ESV)
Sediment	Non-Narcotic Modes of Action - Freshwater Refinement Screening Value for Step 3a (RSV)
Sediment	Non-Narcotic Modes of Action - Marine/Estuarine Ecological Screening Value for Step 2 (ESV)
Sediment	Non-Narcotic Modes of Action - Marine/Estuarine Refinement Screening Value for Step 3a (RSV)
Sediment	Narcotic Modes of Action - Freshwater Ecological Screening Value for Step 2 (ESV)
Sediment	Narcotic Modes of Action - Freshwater Refinement Screening Value for Step 3a (RSV)
Sediment	Narcotic Modes of Action - Marine/Estuarine Ecological Screening Value for Step 2 (ESV)
Sediment	Narcotic Modes of Action - Marine/Estuarine Refinement Screening Value for Step 3a (RSV)
Sediment	Step 3a Sediment Refinement Screening Values (RSV) for PAHs - Freshwater and Saltwater RSVs for Sum Toxic Unit Approach

These values are all available from Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update, Tables 2a-c.

3.3.10 EPA Region 5 Sediment Screening Values

These values are from August 2003 and were obtained from an archived EPA website.

Media	Title
Sediment	RCRA Ecological Screening Value - Sediment

These values are all available here, August 2003.

3.3.11 EPA Region 6 Sediment Screening Values

U.S. EPA Region 6 recommends use of ecological benchmarks developed for The Texas Commission on Environmental Quality (TCEQ). The TCEQ ecological risk assessment program provides guidance and resources for regulated entities that must evaluate ecological risk at a site in one of the Remediation Division programs. According to the Texas Risk Reduction Program (TRRP) rule, some form of an ecological risk assessment is required to be conducted at all remediation sites under this rule.

Media	Title
Sediment	Freshwater Benchmarks
Sediment	Freshwater Second Effects Level Benchmarks
Sediment	Freshwater Benthic PCL
Sediment	Saltwater Benchmarks
Sediment	Saltwater Second Effects Level Benchmarks
Sediment	Saltwater Benthic PCL

These values are all available from Texas Commission on Environmental Quality, 2020 TCEQ Ecological Screening Benchmarks, August 2020.

3.3.12 Florida Department of Environmental Protection (FDEP)

Using the recommended approach, numerical sediment quality assessment guidelines (SQAGs) were developed for assessing sediment quality in Florida coastal waters. These guidelines were derived using information from numerous investigations of coastal sediment quality conducted in North America and are based on a weight of evidence that links contaminant concentrations with adverse biological effects. In this respect, the guidelines are a cost-effective response to a practical need for assessment tools. However, these guidelines should be revised or refined depending on the results of field validation and other related studies conducted in Florida and elsewhere in North America. These guidelines should be used in conjunction with other interpretive tools to conduct comprehensive and reliable assessments.

Media	Title
Sediment	Freshwater - Effects Range - Low (ERL)
Sediment	Non-Narcotic Modes of Action - Freshwater Refinement Screening Value for Step 3a (RSV)
Sediment	Freshwater - Effects Range - Median (ERM)
Sediment	Freshwater - Moderate Effects Threshold (MET)
Sediment	Freshwater - Probable Effects Level (PEL)
Sediment	Freshwater - Severe Effects Level (SEL)
Sediment	Freshwater - Threshold Effects Level (TEL)
Sediment	Freshwater - Toxic Effects Threshold (TET)
Sediment	Marine - Probable Effects Level (PEL)
Sediment	Marine - Threshold Effects Level (TEL)

Freshwater values are available from Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters, January 2003.

Marine values are available from Approach to the Assessment of Sediment Quality in Florida Coastal Waters, Volume 1 – Development and Evaluation of Sediment Quality Assessment Guidelines, November 1994.

3.3.13 Los Alamos National Laboratory (LANL) ECORISK Database – Release 4.4

The ECORISK Database, Version 4.4 (November 2024), is a screening tool developed by Los Alamos National Laboratory (LANL) to evaluate impacts from chemicals and radionuclides in soil, water, sediment, and air on the ecology at LANL. The ECORISK Database contains ecological screening levels (ESLs), which are media- and receptor-specific values that may be used to screen environmental data for ecological risk. Air (pore gas), soil, sediment, and water ESLs are calculated for receptors in various functional feeding guilds (carnivores, herbivores, insectivores, etc.) or selected from the peer-reviewed literature.

Media	Title
Sediment	Sediment Water Low Effect ESL
Sediment	Sediment Water No Effect ESL

See the Intellus New Mexico site here to download the database and associated files.

3.3.14 New York Department of Environmental Conservation

These values reflect the most current scientific analysis of the Division of Fish, Wildlife and Marine Resources (DFWMR) of the New York State Department of Environmental Conservation regarding the potential for adverse impacts to ecological resources from sediment contamination. It is intended to provide guidelines for sediment quality assessment, but it is not a stand-alone document. The references cited should be consulted when more information is needed, particularly for procedures and methods.

Media	Title
Sediment	Freshwater Sediment Class A
Sediment	Freshwater Sediment Class B Low Range
Sediment	Freshwater - Effects Range - Median (ERM)
Sediment	Freshwater Sediment Class C
Sediment	Marine Sediment Class A
Sediment	Marine Sediment Class B Low Range
Sediment	Marine Sediment Class B High Range
Sediment	Marine Sediment Class C
Sediment	Wildlife Sediment

These values are all available from Screening and Assessment of Contaminated Sediment, New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, Bureau of Habitat, June 24, 2014. Freshwater values are in Table 5; Saltwater values in Table 6, and Wildlife values in Table 8.

3.3.15 NOAA Sediment Quality Guidelines

The sediment quality guidelines (SQGS) were initially intended for use by NOAA scientists in ranking areas that warranted further detailed study on the actual occurrence of adverse effects such as toxicity. Also, they were intended for use in ranking chemicals that might be of potential concern. In many regional surveys of sediment toxicity performed throughout North America, NOAA has used the guidelines to compare the degree of contamination among sub-regions, and to identify chemicals elevated

in concentration above the guidelines that were also associated with measures of adverse effects. The SQGs were not promulgated as regulatory criteria or standards. They were not intended as cleanup or remediation targets, nor as discharge attainment targets. Nor were they intended as pass-fail criteria for dredged material disposal decisions or any other regulatory purpose. Rather, they were intended as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments.

Media	Title
Sediment	Effects-Range Low (ERL)
Sediment	Effects-Range Median (ERM)

Values are available from NOAA's National Status and Trends Program, Sediment Quality Guidelines. The values for trace metals can be found in table 1 of the source. The values for organic compounds can be found in table 2 of the source.

3.3.16 Ohio Sediment Reference Values

Ohio-specific Sediment Reference Values (SRVs) were developed to identify representative background sediment concentrations for lotic (flowing) water bodies.

Media	Title
Sediment	Eastern Corn Belt Plains (ECBP)
Sediment	Erie/Ontario Lake Plain (EOLP)
Sediment	Huron/Erie Lake Plain (HELP)
Sediment	Interior Plateau (IP)
Sediment	Western Allegheny Plateau (WAP)
Sediment	Statewide (STW)

These values can be found in Ohio EPA DERR Ecological Risk Assessment Guidance Document. Values were established in February 2003 and revised in April 2008.

3.3.17 Ontario Provincial Sediment Quality Guidelines

The purpose of the Provincial Sediment Quality Guidelines is to protect the aquatic environment by setting safe levels for metals, nutrients (substances which promote the growth of algae) and organic compounds. The guidelines establish three levels of effect - No Effect Level, Lowest Effect Level and Severe Effect Level. The Lowest Effect Level and Severe Effect Level are based on the long- term effects which the contaminants may have on the sediment-dwelling organisms. The No Effect Level is based on levels of chemicals which are so low that significant amounts of contaminants are not expected to be passed through the food chain. Lowest Effect Levels and Severe Effect Levels are based on the 5th and 95th percentiles, respectively, of the Screening Level Concentration (SLC) except when noted with a footnote.

Media	Title
Sediment	Severe Effect Level
Sediment	Lowest Effect Level
Sediment	No Effect Level

These values can be found here. Values were accessed in 2021; the MOE is from 1993.

3.3.18 Washington Sediment Management Standards

The Washington State Sediment Management Standards (SMS) Chapter 173-204 WAC were developed to reduce and ultimately eliminate adverse effects on biological resources and significant threats to human health from surface sediment contamination.

Media	Title
Sediment	Freshwater Cleanup Objective (2013)
Sediment	Freshwater Cleanup Screening Level (2013)
Sediment	Marine Cleanup Objective (2013)
Sediment	Marine Cleanup Screening Level (2013)

Values are found in Table III (Marine) and VI (Freshwater) of Washington Department of Ecology, Sediment Management Standards, Chapter 173-204 WAC, revised February 2013, Effective September 2013.

3.4 SOIL

3.4.1 Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines

Media	Title
Soil	Agricultural
Soil	Residential/Parkland
Soil	Commercial
Soil	Industrial

These values are all available from Canadian Council of the Environment. Website values were accessed in July 2021.

3.4.2 Dutch Soil Ecological Screening Values

The Dutch Soil Protection Act focuses both on prevention of new cases of soil contamination and on dealing with historic cases of contaminated land. Measured concentrations in soil and groundwater are compared with generic Soil Quality Standards (SQSs). There are two types of generic SQSs, namely the Background Values or Target Values and the Intervention Values. Application of these two types of SQSs results in a classification of either 'clean soil', 'slightly contaminated soil' or 'seriously contaminated soil', which have different restrictions.

Media	Title
Soil	Dutch Soil - Background Value (2012)
Soil	Dutch Soil - Intervention Value (2012)
Soil	Dutch Soil - Ecologically-based Risk Limit Intervention Value (HC50) (2012)

For more information on these values, see: FA Swartjes, M Rutgers, JPA Lijzen, PJCM Janssen, PF Otte, A Wintersen, E Brand, L Posthuma. State of the art of contaminated site management in The Netherlands: policy framework and risk assessment tools. Sci Total Environ. 2012 Jun 15; pp. 427-428:1-10.

The SQS values are found in supplementary data tables for the above article. The earlier "Target Values" have been replaced with Background Values. Background values are found in Supplementary Data (SD) 3 - Background Concentrations, Maximal Values 'Residential' land use and Maximal Values 'Industrial' land use. For Intervention Values, the lowest of the scientifically derived ecological risk limits is chosen as the Intervention Value. The ecotoxicologically based risk limit of the Intervention Value has been defined as the HC50 (Hazardous Concentration for 50% of the tested species, i.e., 50% of potentially present organisms exposed at or above the No Observed Effect Concentration (NOEC)). Both Intervention Values are found in Supplementary Data Table 1 - Critical Exposure Values (CEV), Target Values for groundwater, ecologically- based and human health-based risk limits of the Intervention Value, Intervention Values for soil (10% organic matter, 25% clay) and groundwater.

3.4.3 EPA Interim Ecological Soil Screening Levels (ECO-SSLS)

The Ecological Soil Screening Level (Eco-SSL) derivation process is used to derive a set of risk- based Eco-SSLs for many of the soil contaminants that are frequently of ecological concern for plants and animals at hazardous waste sites. On March 15, 2005 all previously posted chemical- specific documents and several standard operating procedures were updated. The update reflects modifications to the wildlife exposure factors and bioaccumulation models. The changes did not substantially change the final Eco-SSL values.

Media	Title
Soil	Eco SSL - Avian
Soil	Eco SSL - Mammalian
Soil	Eco SSL – Soil Invertebrates
Soil	Eco SSL - Plants

EPA. November 2003. Ecological Soil Screening Levels for Aluminum: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-60

EPA. February 2005. Ecological Soil Screening Levels for Antimony: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-61

EPA. March 2005. Ecological Soil Screening Levels for Arsenic: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-62

EPA. February 2005. Ecological Soil Screening Levels for Barium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-63

EPA. February 2005. Ecological Soil Screening Levels for Beryllium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-64

EPA. March 2005. Ecological Soil Screening Levels for Cadmium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-65

EPA. March 2005 (Revised April 2008). Ecological Soil Screening Levels for Chromium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-66

EPA. March 2005. Ecological Soil Screening Levels for Cobalt: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-67

EPA. July 2006 (Revised February 2007). Ecological Soil Screening Levels for Copper: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-68

EPA. November 2003. Ecological Soil Screening Levels for Iron: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-69

EPA. March 2005. Ecological Soil Screening Levels for Lead: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-70

EPA. April 2007. Ecological Soil Screening Levels for Manganese: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-71

EPA. March 2007. Ecological Soil Screening Levels for Nickel: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-76

EPA. July 2007. Ecological Soil Screening Levels for Selenium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-72

EPA. September 2006. Ecological Soil Screening Levels for Silver: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-77

EPA. April 2005. Ecological Soil Screening Levels for Vanadium: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-75

EPA. June 2007. Ecological Soil Screening Levels for Zinc: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-73

EPA. April 2007. Ecological Soil Screening Levels for DDT and metabolites: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-57

EPA. March 2005 (Revised April 2007). Ecological Soil Screening Levels for Dieldrin: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-56

EPA. March 2005 (Revised April 2007). Ecological Soil Screening Levels for Pentachlorophenol: Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-58

EPA. June 2007. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs): Interim Final. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-78

3.4.4 EPA Region 4 Soil Screening Values

Media	Title
Soil	Protection of Avians
Soil	Protection of All Receptors
Soil	Protection of Soil Invertebrates
Soil	Protection of Mammals
Soil	Protection of Plants

These values are all available from Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update, Table 3.

3.4.5 EPA Region 5 Soil Screening Values

These values are from August 2003 and were obtained from an archived EPA website.

Media	Title
Soil	Protection of Avians

These values are all available here, August 2003.

3.4.6 EPA Region 6 Soil Screening Values

U.S. EPA Region 6 recommends use of ecological benchmarks developed for The Texas Commission on Environmental Quality (TCEQ). The TCEQ ecological risk assessment program provides guidance and resources for regulated entities that must evaluate ecological risk at a site in one of the Remediation Division programs. According to the Texas Risk Reduction Program (TRRP) rule, some form of an ecological risk assessment is required to be conducted at all remediation sites under this rule.

Media	Title
Soil	Soil Invertebrates
Soil	Plants

These values are all available from Texas Commission on Environmental Quality, 2020 TCEQ Ecological Screening Benchmarks, August 2020.

3.4.7 Florida Soil Cleanup Target Levels

Media	Title
Soil	Soil Leachability based on Freshwater Criteria
Soil	Soil Leachability based on Marine Water Criteria
Soil	Soil Leachability based on Freshwater and Marine Water Criteria

These values are all available from Table II in Florida Chapter 62-777, last revised June 2016. Values for freshwater and marine are to be assumed the same if not listed otherwise.

3.4.8 Los Alamos National Laboratory (LANL) ECORISK Database – Release 4.4

The ECORISK Database, Version 4.4 (November 2024), is a screening tool developed by Los Alamos National Laboratory (LANL) to evaluate impacts from chemicals and radionuclides in soil, water, sediment, and air on the ecology at LANL. The ECORISK Database contains ecological screening levels (ESLs), which are media- and receptor-specific values that may be used to screen environmental data for ecological risk. Air (pore gas), soil, sediment, and water ESLs are calculated for receptors in various functional feeding guilds (carnivores, herbivores, insectivores, etc.) or selected from the peer-reviewed literature.

Media	Title
Soil	Soil Low Effect
Soil	Soil Effect

See the Intellus New Mexico site here to download the database and associated files.

3.4.9 ORNL Soil Screening Benchmarks

Media	Title
Soil	Soil Invertebrates
Soil	Microbes
Soil	Plants

For soil invertebrates and microbes, see: Efroymson, R.A. , M.E. Will, and G.W. Suter II. 1997b. Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-126/R2. (Available here)

For plants, see: Efroymson, R.A. , M.E. Will, G.W. Suter II, and A.C. Wooten. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM- 85/R3. (Available here)

3.4.10 United Kingdom Soil Screening Values

The Environment Agency proposed Soil screening values (SSVs) as part of a broader framework for ecological risk assessment (ERA) for historical soil contamination. SSVs were defined as '...concentrations of chemical substances found in soils below which there [were] not expected to be any adverse effects on wildlife such as birds, mammals, plants and soil invertebrates, or on the microbial functioning of soils'. SSVs are levels of chemicals in soil below which there is unlikely to be any risk to its health and functions.

Media	Title
Soil	Soil Health and Wildlife

These values are available in Table 4.1 from Derivation and use of soil screening values for assessing ecological risks Report - ShARE id26 (revised), January 2022.

This report adapts SSVs for use in a different purpose, setting out their use in the technical assessment of the recovery of waste and waste-derived materials to land. It updates their scientific basis, taking into account recent developments in international methods on assessing and characterizing the terrestrial ecotoxicity of chemicals published by the European Chemicals Agency. It expands the coverage of chemicals for which an SSV is proposed to include a wider range of common trace elements and persistent organic pollutants that are relevant to wastes applied to land. SSVs cannot and should not be compared directly with the levels of chemicals in a waste or waste-derived material. Soil screening values (SSVs) are indicators to an assessor that soil concentrations above this level may pose an unacceptable risk to soil health and dependent wildlife.

3.4.11 Washington Soil Screening Benchmarks

These values represent soil concentrations that are expected to be protective at any MTCA site and are provided for use in eliminating hazardous substances from further consideration under WAC 173-340-7493 (2)(a)(i). Where these values are exceeded, various options are provided for demonstrating that the hazardous substance does not pose a threat to ecological receptors at a site, or for developing site-specific remedial standards for eliminating threats to ecological receptors. See WAC 173-340-7493 (1)(b)(i), 173-340-7493 (2)(a)(ii) and 173-340-7493(3).

Media	Title
Soil	Wildlife

These values are available in Table 749-3 from WAC 173-340-900. Certified in January 2022.

3.5 SURFACE WATER (INCLUSIVE OF ALL SUBMEDIA TYPES)

3.5.1 Australian and New Zealand Surface Water Benchmarks

The Australian and New Zealand toxicant default guideline values (DGVs) for water quality in aquatic ecosystems should be used in accordance with the detailed guidance provided at Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Media	Title	Type
Surface Water	Freshwater Toxicant LOSP 99	Freshwater
Surface Water	Freshwater Toxicant LOSP 95	Freshwater
Surface Water	Freshwater Toxicant LOSP 90	Freshwater
Surface Water	Freshwater Toxicant LOSP 80	Freshwater
Surface Water	Freshwater Toxicant LOSP Unknown	Freshwater
Surface Water	Marine Toxicant LOSP 99	Saltwater
Surface Water	Marine Toxicant LOSP 95	Saltwater
Surface Water	Marine Toxicant LOSP 90	Saltwater
Surface Water	Marine Toxicant LOSP 80	Saltwater
Surface Water	Marine Toxicant LOSP Unknown	Saltwater

To download the Australian and New Zealand screening benchmarks, go here. These values from 2000 were republished in 2018.

3.5.2 British Columbia Water Quality Guidelines

This source provides all the approved, interim, and working water quality guidelines for British Columbia. These water quality guidelines are generic provincial recommendations that are based on the most current scientific information available at the time of their derivation.

Media	Title	Type
Surface Water	British Columbia Agriculture - Irrigation Long-Term Chronic	Freshwater
Surface Water	British Columbia Agriculture - Irrigation Short-term Acute	Freshwater
Surface Water	British Columbia Agriculture - Livestock Long-Term Chronic	Freshwater
Surface Water	British Columbia Agriculture - Livestock Short-term Acute	Freshwater
Surface Water	British Columbia Aquatic Life - Estuarine Long-Term Chronic	Estuarine
Surface Water	British Columbia Aquatic Life - Estuarine Short-term Acute	Estuarine
Surface Water	British Columbia Aquatic Life - Freshwater Long-term Chronic	Saltwater
Surface Water	British Columbia Aquatic Life - Freshwater Short-term Acute	Saltwater
Surface Water	British Columbia Aquatic Life - Marine Long-term Chronic	Marine
Surface Water	British Columbia Aquatic Life - Marine Short-term Acute	Marine
Surface Water	British Columbia Wildlife - Long-Term Chronic	Freshwater
Surface Water	British Columbia Wildlife - Short-Term Acute	Freshwater

These values are all available here. Values are current as of August 2024.

3.5.3 California Water Quality Guidelines

Media	Title	Type
Surface Water	California Criteria Maximum Concentration, 1-hour average	Saltwater
Surface Water	California Criteria Continuous Concentration, 4-day average	Saltwater
Surface Water	California Instantaneous maximum	Saltwater
Surface Water	NRAWQC 24-hour average	Freshwater
Surface Water	NRAWQC Criteria Maximum Concentration, 1-hour average	Freshwater
Surface Water	NRAWQC Criteria Continuous Concentration, 4- day average	Freshwater
Surface Water	NRAWQC Acute	Freshwater
Surface Water	NRAWQC Chronic	Freshwater
Surface Water	NRAWQC Instantaneous maximum	Freshwater
Surface Water	NRAWQC Other	Freshwater
Surface Water	California Criteria Maximum Concentration, 1-hour average	Freshwater
Surface Water	California Criteria Continuous Concentration, 4-day average	Freshwater
Surface Water	California Ocean 6-month median	Marine
Surface Water	California Ocean daily maximum	Marine
Surface Water	California Ocean Instantaneous maximum	Marine
Surface Water	NRAWQC 24-hour average	Saltwater
Surface Water	NRAWQC Criteria Maximum Concentration, 1-hour average	Saltwater
Surface Water	NRAWQC Criteria Continuous Concentration, 4-day average	Saltwater
Surface Water	NRAWQC Acute	Saltwater
Surface Water	NRAWQC Chronic	Saltwater
Surface Water	NRAWQC Instantaneous maximum	Saltwater
Surface Water	NRAWQC Other	Saltwater

These values are available from California Water Quality Goals. Website values were accessed in April 2022.

3.5.4 Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines

Media	Title	Type
Surface Water	Freshwater Short Term	Freshwater
Surface Water	Freshwater Long Term	Freshwater
Surface Water	Marine Short Term	Saltwater
Surface Water	Marine Long Term	Saltwater
Surface Water	Irrigation	Freshwater
Surface Water	Livestock	Freshwater

These values are all available from Canadian Council of the Environment. Website values were accessed in July 2021.

3.5.5 Delaware Surface Water Quality Guidelines

Media	Title	Type
Surface Water	Freshwater Acute	Freshwater
Surface Water	Freshwater Chronic	Freshwater
Surface Water	Marine Acute	Saltwater
Surface Water	Marine Chronic	Saltwater

These values are all available here. These values were accessed in February 2025.

3.5.6 Environment and Climate Change (ECC) Canada

This source includes all the approved, interim, and working water quality guidelines for British Columbia (B.C.). These water quality guidelines are generic provincial recommendations that are based on the most current scientific information available at the time of their derivation. ECC Canada values are included in the B.C. data with a reference of Environment and Climate Change Canada.

Media	Title	Type
Surface Water	Freshwater Long-Term Chronic	Freshwater
Surface Water	Marine Long-Term Chronic	Saltwater

These values are available here. Website values were accessed in July 2021 (current as of March 2021).

3.5.7 EPA Equilibrium Partitioning Surface Water Benchmarks (ESBS)

As a result of the need for a procedure to assist regulatory agencies in making decisions concerning contaminated sediment problems, the U.S. Environmental Protection Agency (EPA) Office of Science and Technology, Health and Ecological Criteria Division (OST/HECD) and Office of Research and Development National Health and Environmental Effects Research Laboratory (ORD/NHEERL) established a research team to review alternative approaches. The equilibrium partitioning (EqP) approach

was selected for nonionic organic chemicals because it presented the greatest promise for generating defensible, national, numeric chemical-specific benchmarks applicable across a broad range of sediment types.

Media	Title	Type
Surface Water	ESBs-Final Chronic Value (FCV)	Freshwater

These values are available in Table 3-4 of Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures, EPA-600-R- 02-013, November 2003, here.

3.5.8 EPA National Recommended Water Quality Criteria (NRWQC)

The National Recommended Water Quality Criteria (NRWQC)- aquatic life criteria for toxic chemicals are the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species in a given environment or a narrative description of the desired conditions of a water body being "free from" certain negative conditions. The table lists EPA's recommended aquatic life criteria. State and tribal governments may use these criteria or use them as guidance in developing their own.

Media	Title	Type
Surface Water	Freshwater CMC Acute	Freshwater
Surface Water	Freshwater CCC Chronic	Freshwater
Surface Water	Marine CMC Acute	Saltwater
Surface Water	Marine CCC Chronic	Saltwater

These values are available here. Values are current as of February 2025.

3.5.9 EPA Office of Pesticide Programs (OPP)

EPA worked initially with the U.S. Geological Survey to identify aquatic ecotoxicity benchmark values from risk assessments developed by EPA for individual pesticides during previous re- registration programs. The Overview of the Ecological Risk Assessment Process and ecological risk assessments developed for individual pesticides provide an understanding of the ecotoxicity data used to develop benchmarks. Comparing a measured concentration of a pesticide in water with an aquatic life benchmark can be helpful in interpreting monitoring data and in identifying and prioritizing sites and pesticides that may require further investigation. The toxicity data used to develop aquatic life benchmarks are extracted from the most recent publicly available OPP risk assessment for the individual pesticide and are typically based on the most sensitive value for each taxon. Aquatic life benchmarks are estimates of the concentrations below which pesticides are not expected to represent a risk of concern for aquatic life.

Media	Title	Type
Surface Water	Aquatic Life Benchmarks - Acute (for fish, invertebrates, and plants)	Freshwater
Surface Water	Aquatic Life Benchmarks - Chronic (for fish, invertebrates, and plants)	Freshwater

These values are available here. Values were accessed from the website in March 2022. This source contained CAS numbers that were too large for our database. Benchmarks for additional extended CAS chemicals can be found here.

3.5.10 EPA Office of Solid Waste and Emergency Response (OSWER)

This Office of Emergency and Remedial Response (OSWER) Bulletin provides an overview of the development and use of Ecotox Threshold (ET) benchmark values in Superfund ecological risk assessments (ERAs). ETs are defined as media-specific contaminant concentrations above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation. The bulletin describes how ETs are to be used for screening purposes in the Superfund ERA process and summarizes the methodologies used to calculate ETs for each medium.

Media	Title	Type
Surface Water	Freshwater ambient water quality criteria (AWQC) or EPA-derived final chronic values (FCVs)	Freshwater
Surface Water	Freshwater Tier II Methodology	Saltwater
Surface Water	Marine ambient water quality criteria (AWQC) or EPA-derived final chronic values (FCVs)	Freshwater

These values are from Table 2 in the Eco Update of the Ecotox Thresholds, Intermittent Bulletin Volume 3, Number 2; Office of Emergency and Remedial Response (OSWER), Publication 9345.0- 12FSI, EPA 540/F-95/038, PB95-963324, January 1996.

3.5.11 EPA Region 3 BTAG Surface Water Screening Values

For Region 3, BTAG Screening Benchmarks are values used to evaluate sampling data at Superfund sites. These values facilitate consistency in screening level ecological risk assessments throughout Region 3. Additional toxicological information should be considered in Step 3 as provided by the Ecological Risk Assessment Guidance for Superfund (EPA, 1997).

Media	Title	Type
Surface Water	Freshwater BTAG	Freshwater
Surface Water	Marine BTAG	Saltwater

The freshwater values can be found here and marine values here, 7/2006.

3.5.12 EPA Region 4 Surface Water Screening Values

Media	Title	Type
Surface Water	Acute Freshwater Values	Freshwater
Surface Water	Acute Marine Values	Saltwater
Surface Water	Chronic Freshwater Values	Freshwater
Surface Water	Chronic Marine Values	Saltwater
Surface Water	Narcotic Mode of Action - Freshwater Acute Values	Freshwater
Surface Water	Narcotic Mode of Action - Saltwater Acute Values	Saltwater
Surface Water	Narcotic Mode of Action - Freshwater Chronic Values	Freshwater
Surface Water	Narcotic Mode of Action - Saltwater Chronic Values	Saltwater
Surface Water	PAHs - Freshwater Acute Values	Freshwater
Surface Water	PAHs - Saltwater Acute Values	Saltwater
Surface Water	PAHs - Freshwater Chronic Values	Freshwater
Surface Water	PAHs - Saltwater Chronic Values	Freshwater

These values are all available from Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update, Tables 1a, 1d, and 1e.

3.5.13 EPA Region 5 Surface Water Screening Values

These values are from August 2003 and were obtained from an archived EPA website.

Media	Title	Type
Surface Water	ESBs-Final Chronic Value (FCV)	Freshwater/Saltwater

These values are all available here, August 2003.

3.5.14 EPA Region 6 Surface Water Screening Values

U.S. EPA Region 6 recommends use of ecological benchmarks developed for The Texas Commission on Environmental Quality (TCEQ). The TCEQ ecological risk assessment program provides guidance and resources for regulated entities that must evaluate ecological risk at a site in one of the Remediation Division programs. According to the Texas Risk Reduction Program (TRRP) rule, some form of an ecological risk assessment is required to be conducted at all remediation sites under this rule.

Media	Title	Type
Surface Water	Freshwater Acute Benchmarks	Freshwater
Surface Water	Freshwater Chronic Benchmarks	Saltwater
Surface Water	Saltwater Acute Benchmarks	Saltwater
Surface Water	Saltwater Chronic Benchmarks	Saltwater

These values are all available from Texas Commission on Environmental Quality, 2023 TCEQ Ecological Screening Benchmarks, August 2023.

3.5.15 Florida Surface Water Screening Values

The following Contaminant Cleanup Target Levels for surface water are provided here. Values are from 2005.

Media	Title	Type
Surface Water	Freshwater Contaminant Cleanup	Freshwater
Surface Water	Marine Water Contaminant Cleanup	Marine
Surface Water	Freshwater and Marine Water Contaminant Cleanup	Freshwater/Marine

The following Surface Water Quality Standards are provided here. Values are from 2016. These values contain surface water quality criteria to be applied except within zones of mixing.

Media	Title	Type
Surface Water	Shellfish Propagation or Harvesting Criteria	Freshwater
Surface Water	Fish Consumption in Predominantly Fresh Waters	Freshwater
Surface Water	Fish Consumption in Predominantly Marine Waters	Saltwater

3.5.16 Illinois Aquatic Life Criteria

These criteria serve to protect aquatic life for General Use Waters and for Lake Michigan Basin Waters. Lake Michigan Basin waters include all tributaries of Lake Michigan, harbors, and open waters of the Illinois portion of the lake. General Use Waters cover all other waters of the state except those waters designated as Secondary Contact and Indigenous Aquatic Life Use Waters, which consist of several canals and rivers in the Chicago area.

Media	Title	Type
Surface Water	Acute – General Use	Freshwater
Surface Water	Acute – Lake Michigan	Freshwater
Surface Water	Chronic – General Use	Freshwater
Surface Water	Chronic – Lake Michigan	Freshwater

Values are available at Illinois Aquatic Life Criteria, last revised November 2019.

3.5.17 Los Alamos National Laboratory (LANL) ECORISK Database – Release 4.4

The ECORISK Database, Version 4.4 (November 2024), is a screening tool developed by Los Alamos National Laboratory (LANL) to evaluate impacts from chemicals and radionuclides in soil, water, sediment, and air on the ecology at LANL. The ECORISK Database contains ecological screening levels (ESLs), which are media- and receptor-specific values that may be used to screen environmental data for ecological risk. Air (pore gas), soil, sediment, and water ESLs are calculated for receptors in various functional feeding guilds (carnivores, herbivores, insectivores, etc.) or selected from the peer-reviewed literature.

Media	Title	Type
Surface Water	Surface Water Low Effect ESL	Freshwater
Surface Water	Surface Water No Effect ESL	Freshwater

See the Intellus New Mexico site here to download the database and associated files.

3.5.18 New Jersey Department of Environmental Protection Ecological Screening Criteria

New Jersey Surface Water Quality Standards apply to all surface waters of the State. For the following 4 categories, there are generic values as well as values for trout production and maintenance; non-trout lakes, ponds, and reservoirs in the summer; non-trout lakes, ponds, and reservoirs in the winter; pinelands waters; saline coastal general waters; and shellfish harvesting saline estuary.

Media	Title	Type
Surface Water	Acute – General Use	Freshwater
Surface Water	Acute – Lake Michigan	Freshwater
Surface Water	Chronic – General Use	Freshwater
Surface Water	Chronic – Lake Michigan	Freshwater

Values are available in Table 7 of NJDEP-N.J.A.C 7:9B, last amended April 2020.

3.5.19 Oak Ridge National Laboratory Surface Water Benchmarks

The purpose of this report is to present and analyze alternate toxicological benchmarks for screening chemicals for aquatic ecological effects. Since the prior edition of this report (Suter and Mabrey 1994), both the U.S. Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) and EPA Region IV have developed sets of screening benchmarks for water. This report includes those values and updates the other benchmarks that were presented in the last edition. This compilation is limited to chemicals that have been detected on the Oak Ridge Reservation and to

benchmarks derived from studies of toxic effects on freshwater organisms. The list of chemicals detected on the Oak Ridge Reservation includes 45 metals and 105 industrial chemicals.

The lowest acceptable chronic value (LCV) is based on the geometric mean of the Lowest Observed Effect Concentration and the No Observed Effect Concentration. Chronic values are used to calculate the chronic NAWQC, but the lowest chronic value may be lower than the chronic NAWQC. Tier II values were developed so that aquatic benchmarks could be established with fewer data than are required for National Ambient Water Quality Criteria. The Tier II Secondary Acute Value (SAV) is derived by taking the lowest genus mean acute value from data meeting specified criteria and dividing it by a Final Acute Value Factor whose value depends on the number of acute data requirements that are met.

Media	Title	Type
Surface Water	Lowest Chronic Values - Daphnids	Freshwater
Surface Water	Lowest Chronic Values - Fish	Freshwater
Surface Water	Lowest Chronic Values - Non-daphnid Invertebrates	Freshwater
Surface Water	Lowest Chronic Values - Aquatic Plants	Freshwater
Surface Water	Lowest Chronic Values - All Organisms	Freshwater
Surface Water	Tier II Secondary Acute Value	Freshwater
Surface Water	Tier II Secondary Chronic Value	Freshwater

These values are all available from Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision.

The EC20 benchmarks are the lowest test EC20 (20% effects concentration) values. They represent the highest tested concentration not causing a reduction of as much as 20% in the reproductive output of female test organisms. The benchmarks for EC20 Sensitive Species were derived similar to chronic criteria, except that the lowest EC20 for the chemical was used in place of the lowest chronic value. The EC25 Bass Population benchmark consists of estimates of the concentration causing a 25% reduction in the recruit abundance of a population of largemouth bass.

Media	Title	Type
Surface Water	EC20 Daphnids	Freshwater
Surface Water	EC20 Fish	Freshwater
Surface Water	EC20 Sensitive Species	Freshwater
Surface Water	EC25 Bass Population	Freshwater

These values are all available from Toxicological Benchmarks For Screening Contaminants of Potential Concern For Effects on Freshwater Biota, (Suter 1995).

3.5.20 Ohio Water Quality Standards

Media	Title	Type
Surface Water	Inside Mixing Zone Maximum (IMZM)	Saltwater
Surface Water	Inside Mixing Zone Maximum (IMZM) Lake Erie Drainage Basin	Saltwater
Surface Water	Inside Mixing Zone Maximum (IMZM) Water Warm Habitat (WWH)	Saltwater
Surface Water	Inside Mixing Zone Maximum (IMZM) Limited Resource Water (LRW)	Freshwater
Surface Water	Inside Mixing Zone Maximum (IMZM) Seasonal Salmonid Habitat (SSH)	Freshwater
Surface Water	Outside Mixing Zone Maximum (OMZM)	Freshwater
Surface Water	Outside Mixing Zone Maximum (OMZM) Lake Erie Drainage Basin	Freshwater
Surface Water	Outside Mixing Zone Maximum (OMZM) Warm Water Habitat (WWH)	Freshwater
Surface Water	Outside Mixing Zone Maximum (OMZM) Limited Resource Water (LRW)	Freshwater
Surface Water	Outside Mixing Zone Maximum (OMZM) Seasonal Salmonid Habitat (SSH)	Freshwater
Surface Water	Outside Mixing Zone Average (OMZA)	Freshwater
Surface Water	Outside Mixing Zone Average (OMZA) Warm Water Habitat (WWH)	Freshwater
Surface Water	Outside Mixing Zone Average (OMZA) Exceptional Warm Water Habitat (EWH)	Marine
Surface Water	Outside Mixing Zone Average (OMZA) Modified Warm Water Habitat (MWH)	Marine
Surface Water	Outside Mixing Zone Average (OMZA) Cold Water Habitat (CWH)	Marine
Surface Water	Outside Mixing Zone Average (OMZA) Lake Erie Drainage Basin	Saltwater
Surface Water	Outside Mixing Zone Average (OMZA) Seasonal Salmonid Habitat (SSH)	Saltwater
Surface Water	Outside Mixing Zone Average (OMZA) Ohio River Drainage Basin	Saltwater

These values can be found at State of Ohio Water Quality Standards, OAC Chapter 3745-1. Values were deemed effective since June 2021, Table 35-1.

4. RADIONUCLIDE SOURCES

Only two sources of ecological benchmarks for radionuclides have been identified and included in this tool. They are the Los Alamos National Laboratory ECORISK Database - Release 4.3 and the U.S. EPA Region 6 recommendation of using the Texas Commission on Environmental Quality (TCEQ) benchmarks.

4.1 LOS ALAMOS NATIONAL LABORATORY (LANL) ECORISK DATABASE – RELEASE 4.4

The ECORISK Database, Version 4.4 (November 2024), is a screening tool developed by Los Alamos National Laboratory (LANL) to evaluate impacts from chemicals and radionuclides in soil, water, sediment, and air on the ecology at LANL. The ECORISK Database contains ecological screening levels (ESLs), which are media- and receptor-specific values that may be used to screen environmental data for ecological risk. Air (pore gas), soil, sediment, and water ESLs are calculated for receptors in various functional feeding guilds (carnivores, herbivores, insectivores, etc.) or selected from the peer-reviewed literature.

Media	Title
Sediment	LANL ECORISK Database Release 4.4 - Radiological Sediment Low Effect
Sediment	LANL ECORISK Database Release 4.4 - Radiological Sediment No Effect
Soil	LANL ECORISK Database Release 4.4 - Radiological Soil Low Effect
Soil	LANL ECORISK Database Release 4.4 - Radiological Soil No Effect
Surface Water	LANL ECORISK Database Release 4.4 - Radiological Surface Water Low Effect
Surface Water	LANL ECORISK Database Release 4.4 - Radiological Surface Water No Effect

The LANL data provides benchmarks for soil, surface water, and sediment for 25 isotopes. Benchmarks include low effect and no effect levels for the following organisms:

Media	Organism	Type
Soil	American Kestrel	Avian Top Carnivore
Soil	American Kestrel	Insectivore/Carnivore
Soil	American Robin	Avian Herbivore
Soil	American Robin	Avian Insectivore
Soil	American Robin	Avian Omnivore
Soil	Deer Mouse	Mammalian Omnivore
Soil	Earthworm	Soil-Dwelling Invertebrate
Soil	Generic Plant	Terrestrial Autotroph – Producer
Soil	Gray Fox	Mammalian Top Carnivore
Soil	Montane Shrew	Mammalian Insectivore
Soil	Mountain Cottontail	Mammalian Herbivore
Surface Water	Algae	Aquatic Autotroph – Producer
Surface Water	Aquatic Snails	Aquatic Herbivore – Grazer
Surface Water	Daphnids	Aquatic Omnivore/Herbivore
Surface Water	Fish	Aquatic Intermediate Carnivore
Surface Water	Occult Little Brown Myotis Bat	Mammalian Aerial Insectivore
Surface Water	Violet-green Swallow	Avian Aerial Insectivore
Sediment	Algae	Aquatic Autotroph – Producer
Sediment	American Kestrel	N/A
Sediment	American Robin	N/A
Sediment	Aquatic Snails	Aquatic Herbivore – Grazer
Sediment	Daphnids	Aquatic Omnivore/Herbivore
Sediment	Deer Mouse	N/A
Sediment	Fish	Aquatic Intermediate Carnivore
Sediment	Gray Fox	N/A
Sediment	Montane Shrew	N/A
Sediment	Mountain Cottontail	N/A
Sediment	Occult Little Brown Myotis Bat	N/A
Sediment	Violet-green Swallow	N/A

See the Intellus New Mexico site here to download the database and associated files.

4.2 EPA REGION 6

The TCEQ data provides aquatic benchmarks (surface water and sediment) and terrestrial benchmarks (surface water and soil) for 23 isotopes. The benchmarks are based on the U.S. Department of Energy's "A graded approach for evaluating radiation doses to aquatic and terrestrial biota". Technical Standard DOE-STD-1153- 2002. The benchmarks are called biota concentration guides (BCGs) and are taken from August 2020.

Media	Title
Sediment	EPA Region 6 Benchmarks for Radionuclides- Aquatic Sediment BCG Benchmark
Soil	EPA Region 6 Benchmarks for Radionuclides- Terrestrial Soil BCG Benchmark
Surface Water	EPA Region 6 Benchmarks for Radionuclides- Aquatic Water BCG Benchmark
Surface Water	EPA Region 6 Benchmarks for Radionuclides- Terrestrial Water BCG Benchmark

5. CHEMICAL BENCHMARKS FOR AIR

Table 1: Benchmark Values for Acetone in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
67−64−1	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	530.0	

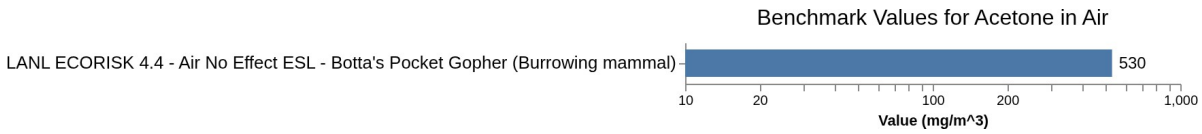


Table 2: Benchmark Values for Benzene in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
71−43−2	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	25.0	

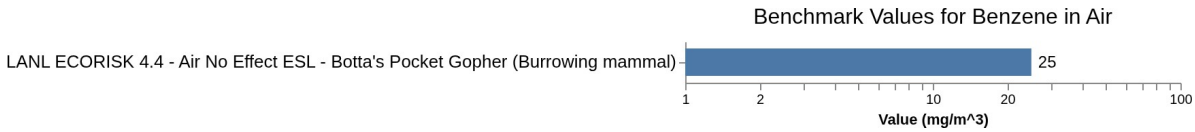


Table 3: Benchmark Values for Carbon Tetrachloride in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
56−23−5	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	5.7	

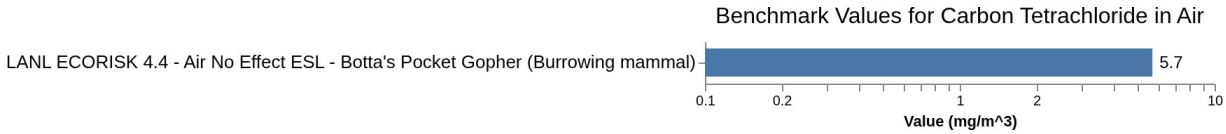


Table 4: Benchmark Values for Chloroform in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
67−66−3	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	20.0	

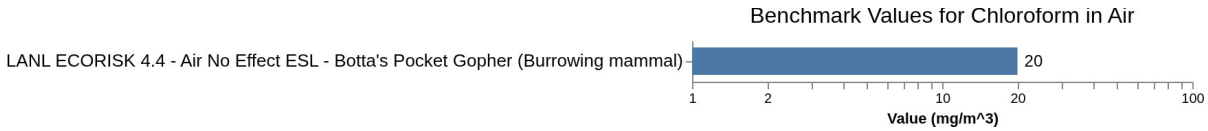


Table 5: Benchmark Values for Chloromethane in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
74−87−3	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	21.0	

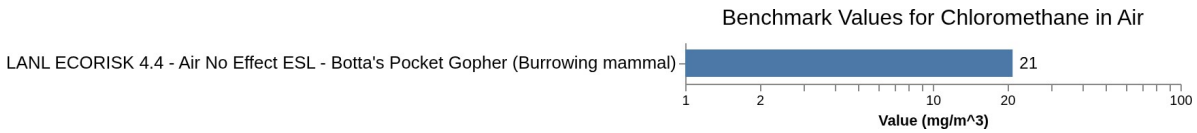


Table 6: Benchmark Values for Dichlorodifluoromethane in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
75−71−8	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	2600.0	

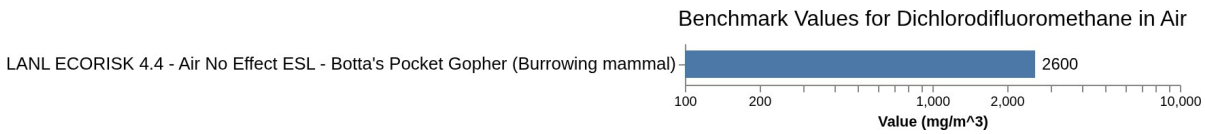


Table 7: Benchmark Values for Dichloroethane, 1,1− in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
75−34−3	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	5600.0	

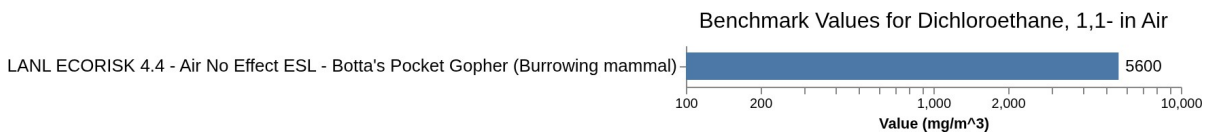


Table 8: Benchmark Values for Dichloroethane, 1,2− in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
107−06−2	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	41.0	

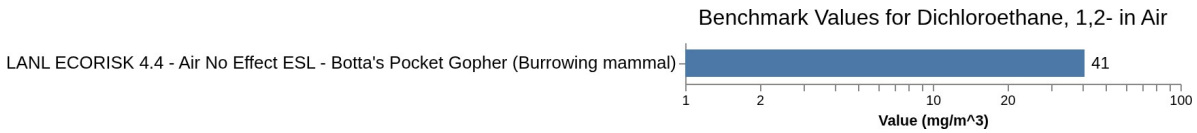


Table 9: Benchmark Values for Dichloroethylene, 1,1− in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
75−35−4	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	5.7	

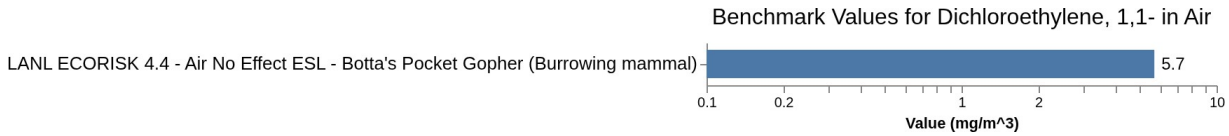


Table 10: Benchmark Values for Methylene Chloride in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
75−09−2	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	1300.0	

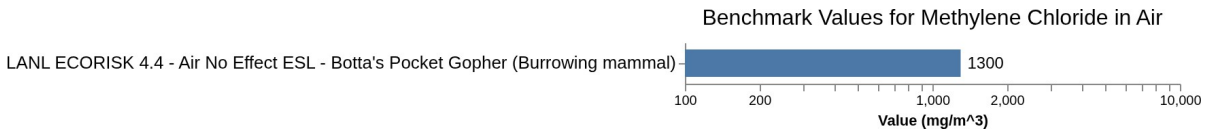


Table 11: Benchmark Values for Tetrachloroethylene in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
127−18−4	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	73.0	

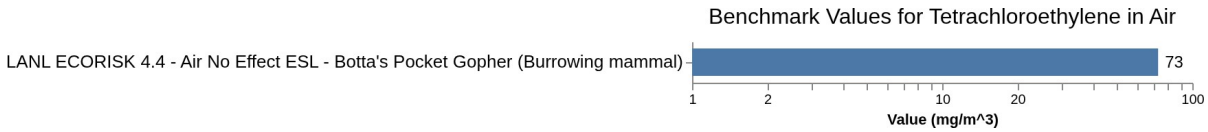


Table 12: Benchmark Values for Toluene in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
108−88−3	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	60.0	

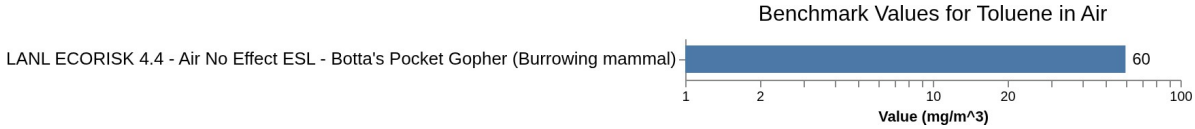


Table 13: Benchmark Values for Trichloroethane, 1,1,1− in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
71−55−6	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	240.0	

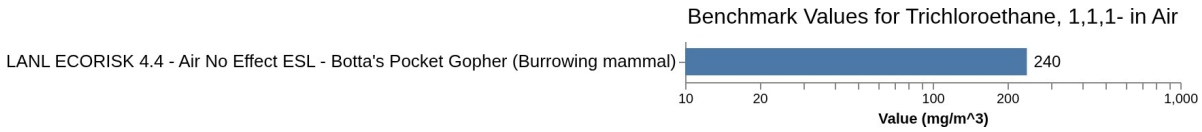


Table 14: Benchmark Values for Trichloroethylene in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
79−01−6	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	19.0	

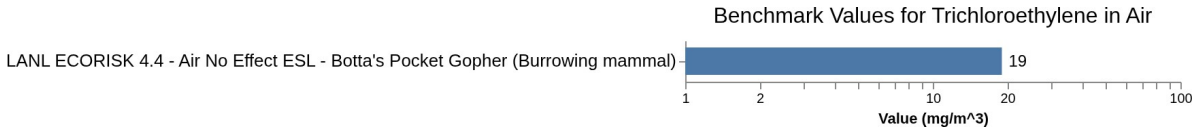


Table 15: Benchmark Values for Trichlorofluoromethane in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
75−69−4	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	820.0	

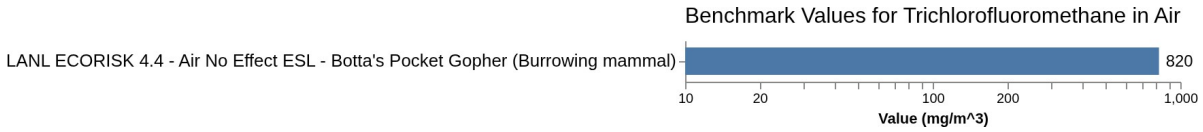
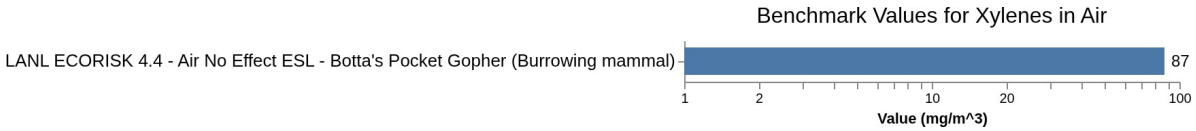


Table 16: Benchmark Values for Xylenes in Air

CAS	Source	Benchmark	Organism	Value (mg/m^3)	Footnotes
1330−20−7	LANL ECORISK	Air No Effect ESL	Botta's Pocket Gopher	87.0	



6. CHEMICAL BENCHMARKS FOR BIOTA

Table 17: Benchmark Values for Aldrin in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
309−00−2	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.022	
309−00−2	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.120	

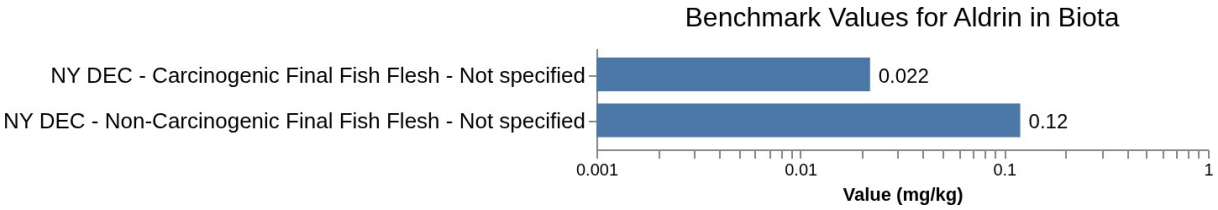


Table 18: Benchmark Values for Aroclor 1242 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
53469−21−9	Canada	Tissue Residue	Mammalian	0.000004	45
53469−21−9	Canada	Tissue Residue	Avian	0.000563	45
53469−21−9	SETAC ECW	Avian Egg	Not specified	1.000000	

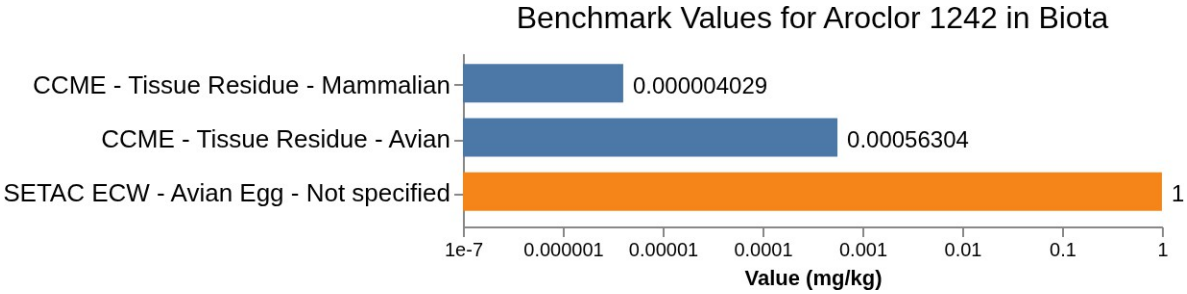


Table 19: Benchmark Values for Aroclor 1248 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
12672−29−6	Canada	Tissue Residue	Mammalian	0.000010	45
12672−29−6	Canada	Tissue Residue	Avian	0.000603	45

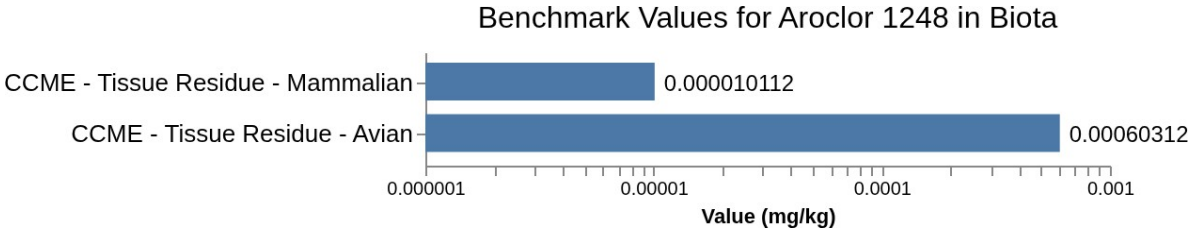


Table 20: Benchmark Values for Aroclor 1254 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
11097−69−1	Canada	Tissue Residue	Mammalian	0.000024	45
11097−69−1	Canada	Tissue Residue	Avian	0.000107	45
11097−69−1	SETAC ECW	Avian Egg	Not specified	4.000000	

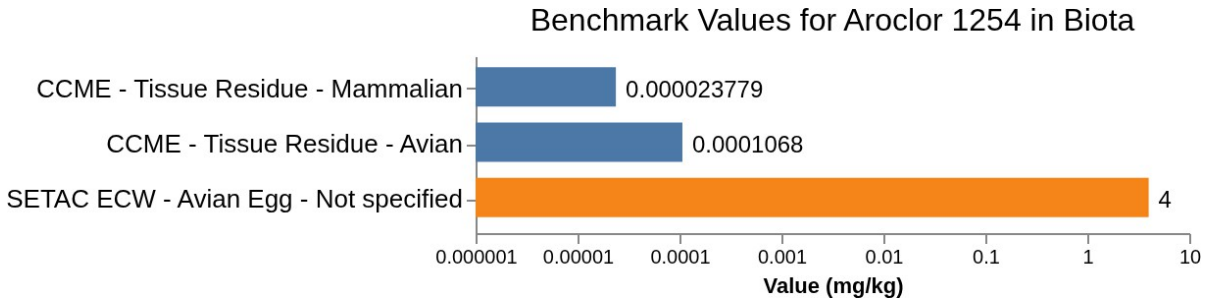


Table 21: Benchmark Values for Aroclor 1260 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
11096−82−5	Canada	Tissue Residue	Mammalian	0.000009	45
11096−82−5	Canada	Tissue Residue	Avian	0.000061	45

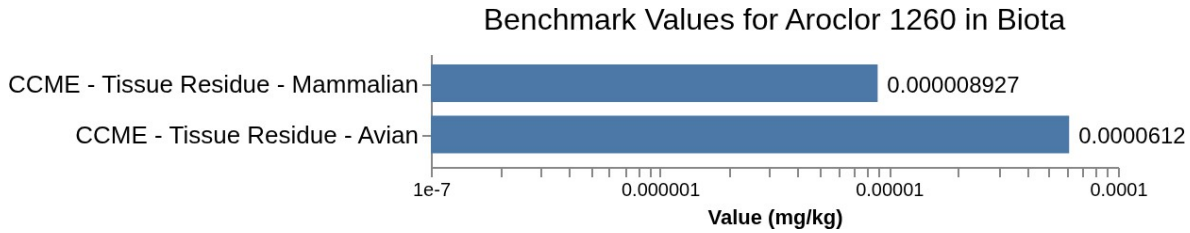


Table 22: Benchmark Values for Bisphenol A in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
80−05−7	ECC Canada	Wildlife Dietary LTC	Not specified	0.11	

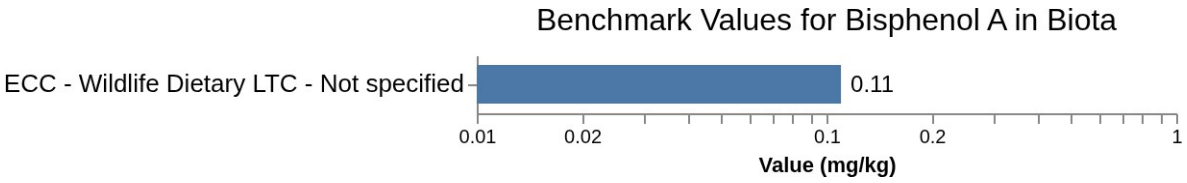


Table 23: Benchmark Values for Cadmium (Diet) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
7440−43−9	SETAC ECW	Avian Diet	Not specified	2.0	
7440−43−9	SETAC ECW	Avian Liver	Not specified	40.0	
7440−43−9	SETAC ECW	Mammal Kidney	Not specified	100.0	
7440−43−9	SETAC ECW	Avian Kidney	Not specified	100.0	

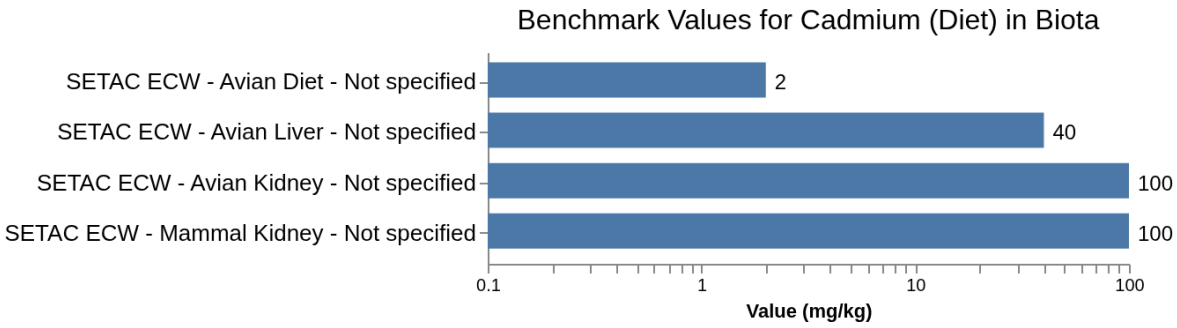


Table 24: Benchmark Values for Chlordane in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57−74−9	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.37	
57−74−9	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.50	

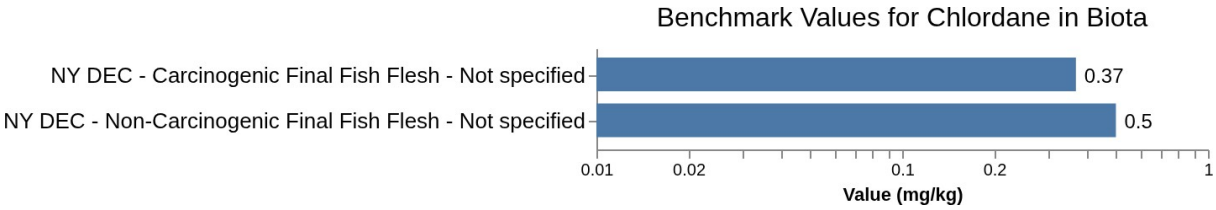


Table 25: Benchmark Values for Clophen A50 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
8068−44−8	Canada	Tissue Residue	Mammalian	0.000372	45
8068−44−8	Canada	Tissue Residue	Avian	0.001145	45

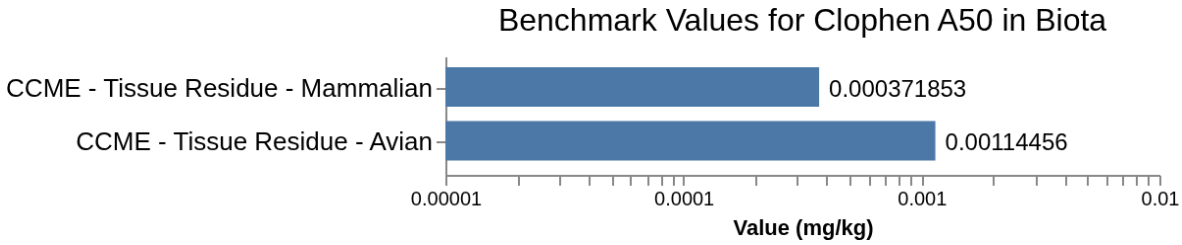


Table 26: Benchmark Values for Clophen A60 in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
11096−99−4	Canada	Tissue Residue	Mammalian	0.000077	45
11096−99−4	Canada	Tissue Residue	Avian	0.000876	45

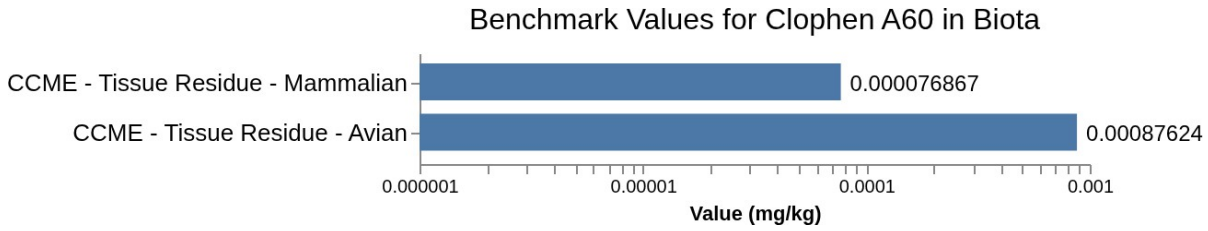


Table 27: Benchmark Values for DDT/DDE/DDD (total) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
000000−05−1	Canada	Tissue Residue	Not specified	0.014	
000000−05−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.200	
000000−05−1	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.270	
000000−05−1	SETAC ECW	Avian Brain	Not specified	10.000	

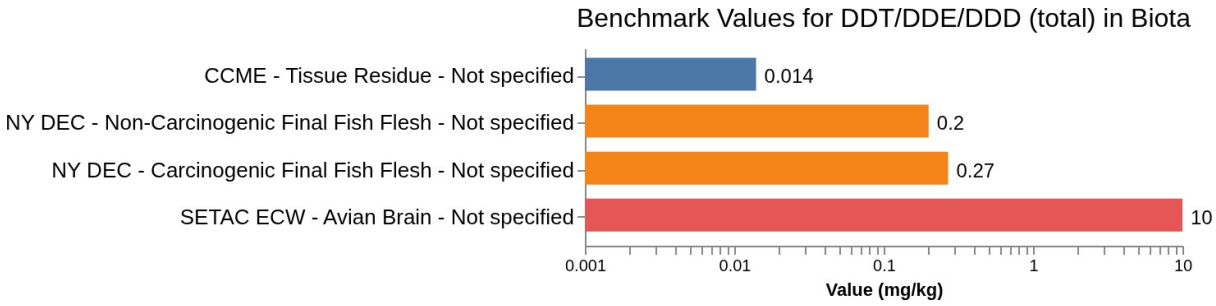


Table 28: Benchmark Values for Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'− (BDE−209) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
1163−19−5	ECC Canada	Wildlife Dietary LTC	Not specified	0.009	

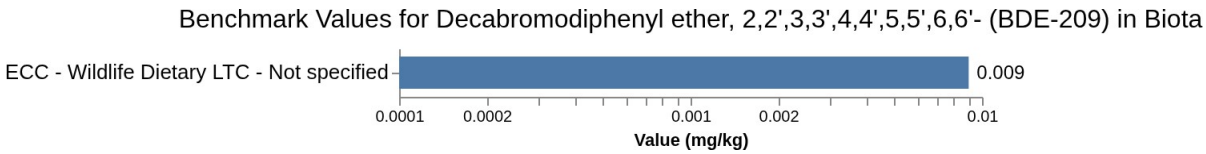


Table 29: Benchmark Values for Dichlorodiphenyldichloroethane, p,p'− (DDD) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
72−54−8	SETAC ECW	Avian Brain	Not specified	50.0	

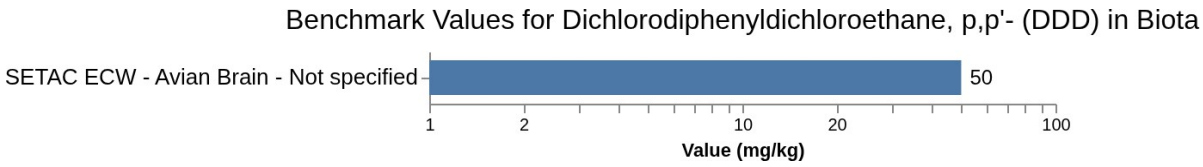


Table 30: Benchmark Values for Dichlorodiphenyldichloroethylene, p,p'− (DDE) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
72−55−9	SETAC ECW	Avian Diet	Not specified	0.1	
72−55−9	SETAC ECW	Avian Egg	Not specified	0.1	
72−55−9	SETAC ECW	Avian Brain	Not specified	150.0	

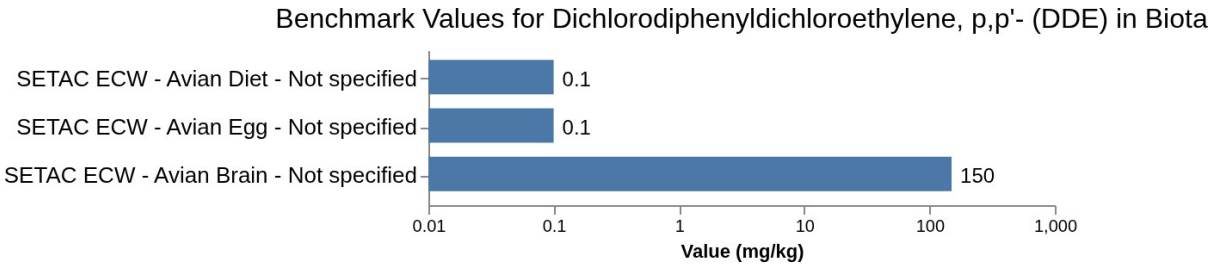


Table 31: Benchmark Values for Dichlorodiphenyltrichloroethane, p,p'− (DDT) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
50−29−3	SETAC ECW	Avian Brain	Not specified	10.0	

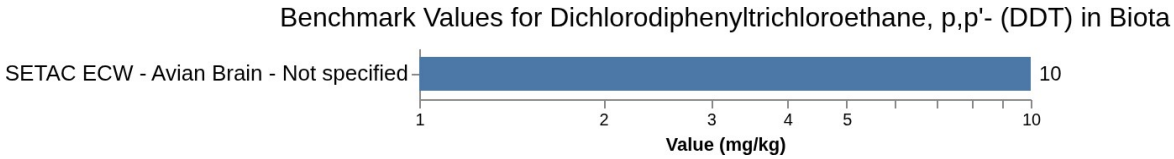


Table 32: Benchmark Values for Dieldrin in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
60−57−1	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.022	
60−57−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.120	
60−57−1	SETAC ECW	Avian Egg	Not specified	0.700	
60−57−1	SETAC ECW	Avian Liver	Not specified	1.000	
60−57−1	SETAC ECW	Avian Brain	Not specified	1.000	
60−57−1	SETAC ECW	Avian Diet	Not specified	2.000	

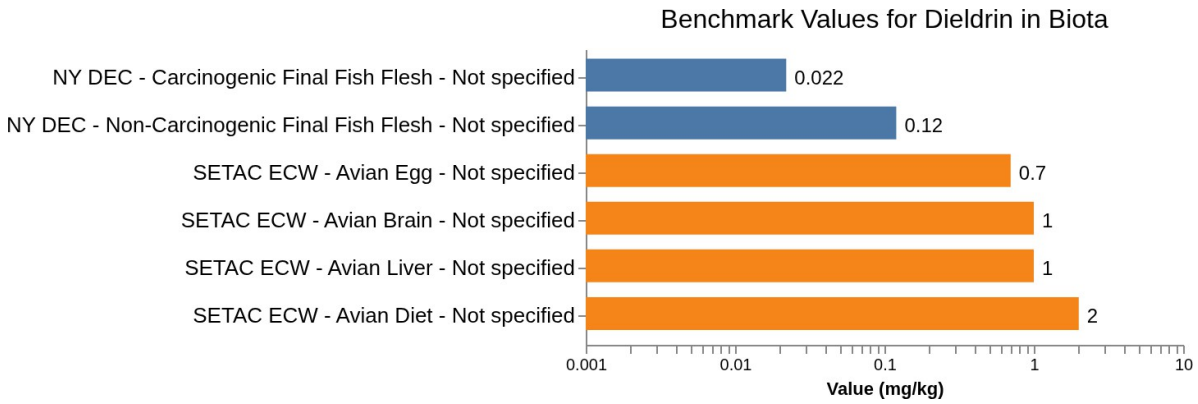


Table 33: Benchmark Values for Endrin in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
72−20−8	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.025	
72−20−8	SETAC ECW	Avian Egg	Not specified	0.270	
72−20−8	SETAC ECW	Avian Carcass	Not specified	0.360	
72−20−8	SETAC ECW	Avian Diet	Not specified	3.000	

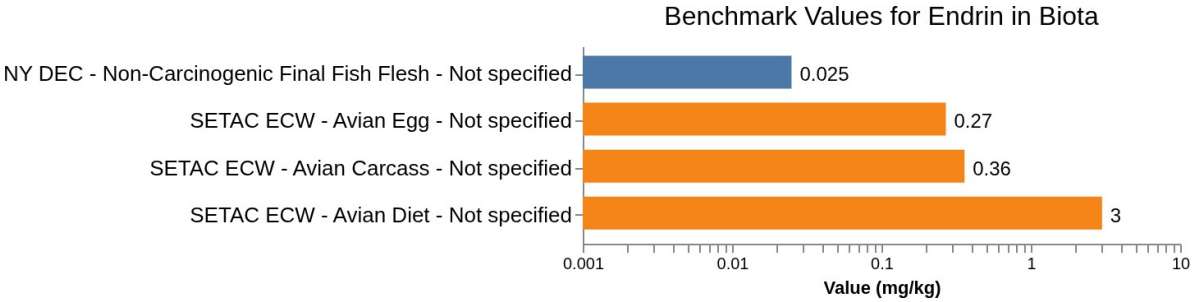


Table 34: Benchmark Values for Fluoride in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
16984−48−8	SETAC ECW	Mammal Blood	Not specified	10.0	

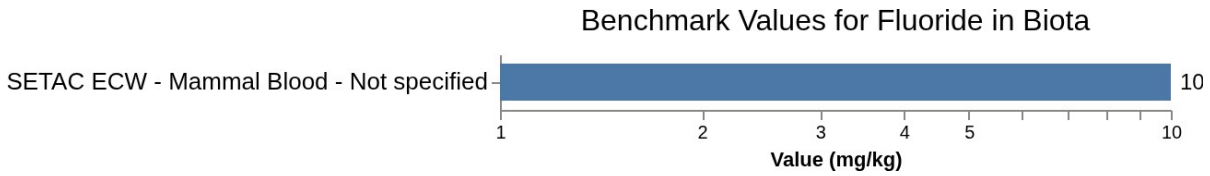


Table 35: Benchmark Values for Heptachlor Epoxide in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
1024−57−3	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.20	
1024−57−3	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.21	
1024−57−3	SETAC ECW	Avian Egg	Not specified	1.50	

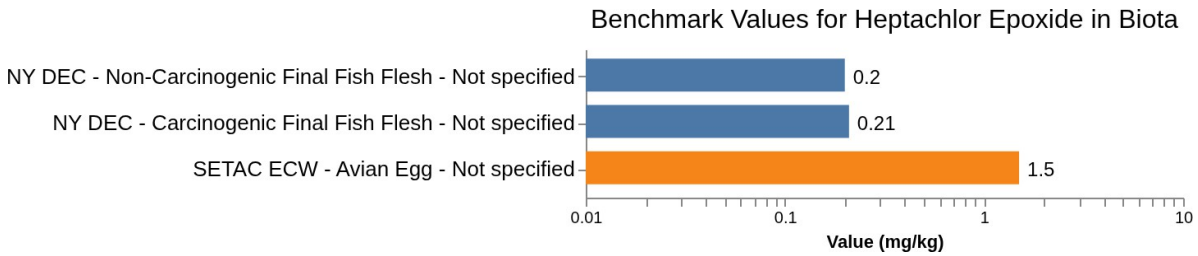


Table 36: Benchmark Values for Heptachlor in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
76−44−8	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.20	
76−44−8	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.21	

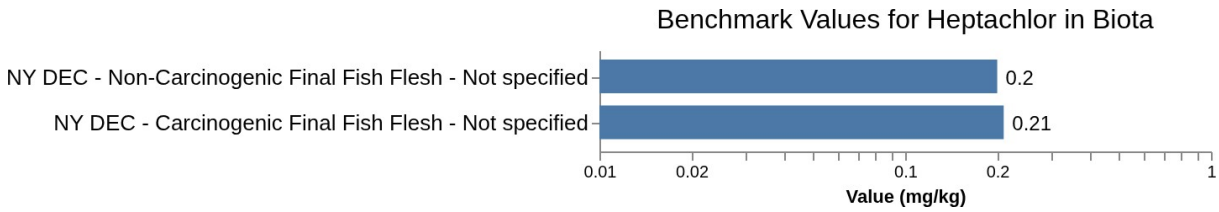


Table 37: Benchmark Values for Heptachlorobiphenyl, 2,3,3',4,4',5,5'− (PCB 189) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
39635−31−9	Canada	Tissue Residue	Avian	2.400000e-11	45
39635−31−9	Canada	Tissue Residue	Mammalian	7.900000e-11	45

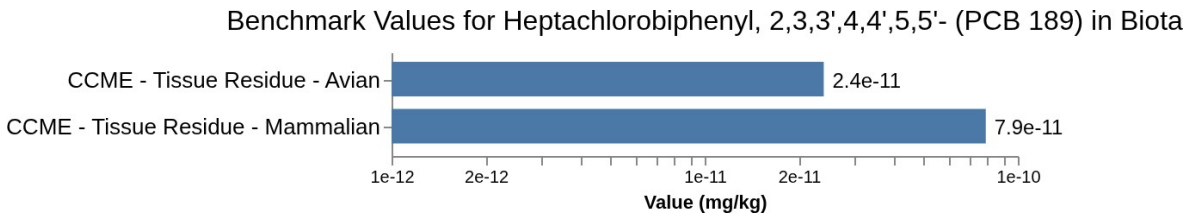


Table 38: Benchmark Values for Hexabromocyclododecane (HBCD) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
3194−55−6	ECC Canada	Wildlife Dietary LTC	Not specified	40.0	

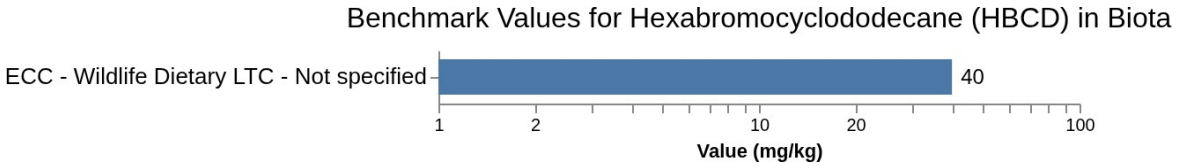


Table 39: Benchmark Values for Hexachlorobenzene in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
118−74−1	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.20	
118−74−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.33	
118−74−1	SETAC ECW	Avian Egg	Not specified	100.00	

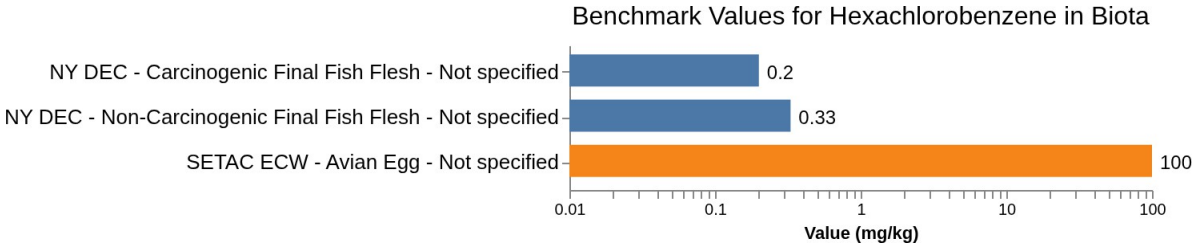


Table 40: Benchmark Values for Hexachlorobiphenyl, 2,3',4,4',5,5'− (PCB 167) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
52663−72−6	Canada	Tissue Residue	Mammalian	7.900000e-12	45
52663−72−6	Canada	Tissue Residue	Avian	2.400000e-11	45

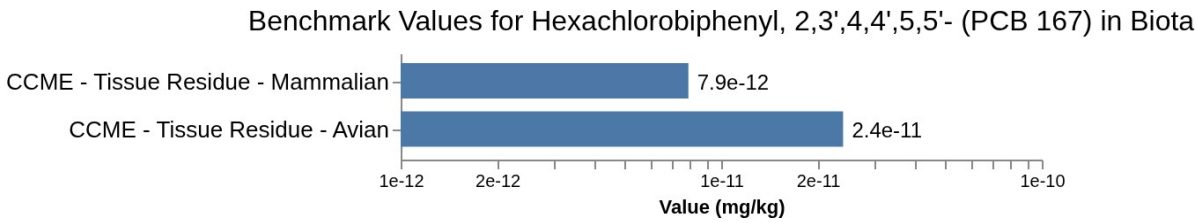


Table 41: Benchmark Values for Hexachlorobiphenyl, 2,3,3',4,4',5− (PCB 156) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
38380−08−4	Canada	Tissue Residue	Avian	2.400000e-10	45
38380−08−4	Canada	Tissue Residue	Mammalian	3.950000e-10	45

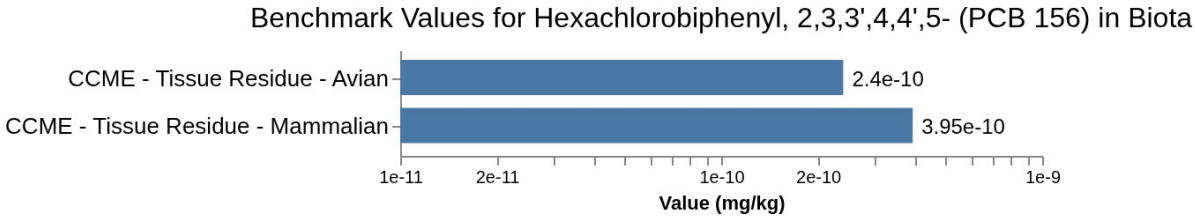


Table 42: Benchmark Values for Hexachlorobiphenyl, 2,3,3',4,4',5'− (PCB 157) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
69782−90−7	Canada	Tissue Residue	Avian	2.400000e-10	45
69782−90−7	Canada	Tissue Residue	Mammalian	3.950000e-10	45

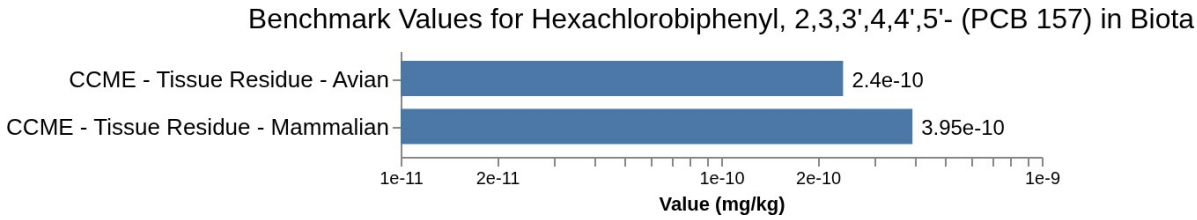


Table 43: Benchmark Values for Hexachlorobiphenyl, 3,3',4,4',5,5'− (PCB 169) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
32774−16−6	Canada	Tissue Residue	Avian	2.400000e-09	45
32774−16−6	Canada	Tissue Residue	Mammalian	7.900000e-09	45

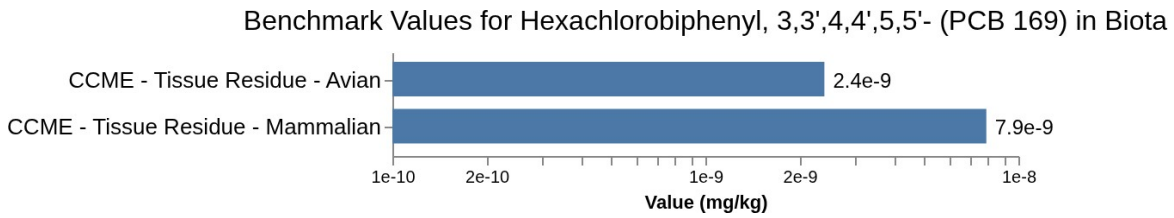


Table 44: Benchmark Values for Hexachlorobutadiene in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
87−68−3	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	1.3	
87−68−3	New York DEC	Carcinogenic Final Fish Flesh	Not specified	4.5	

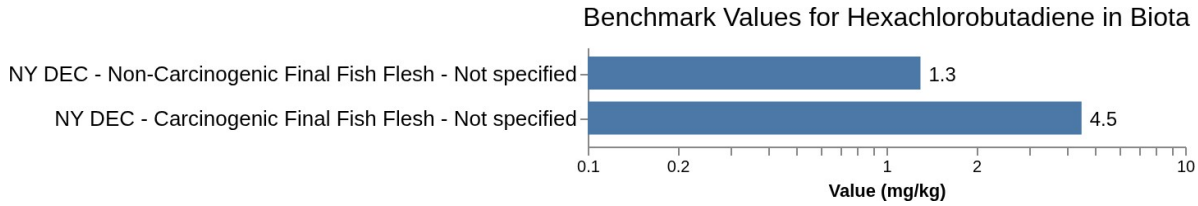


Table 45: Benchmark Values for Hexachlorocyclohexane, Alpha− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
319−84−6	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.10	
319−84−6	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.51	

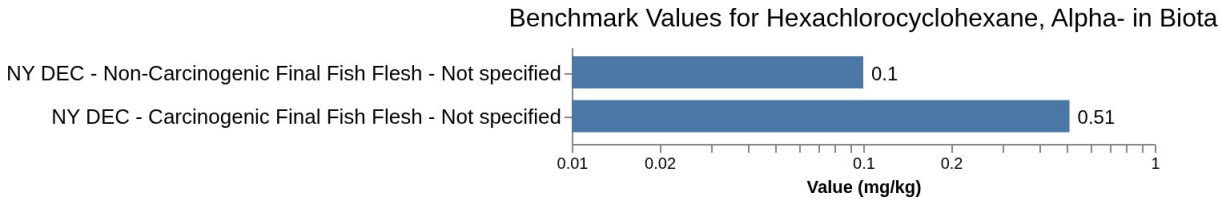


Table 46: Benchmark Values for Hexachlorocyclohexane, Beta− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
319−85−7	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.10	
319−85−7	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.51	

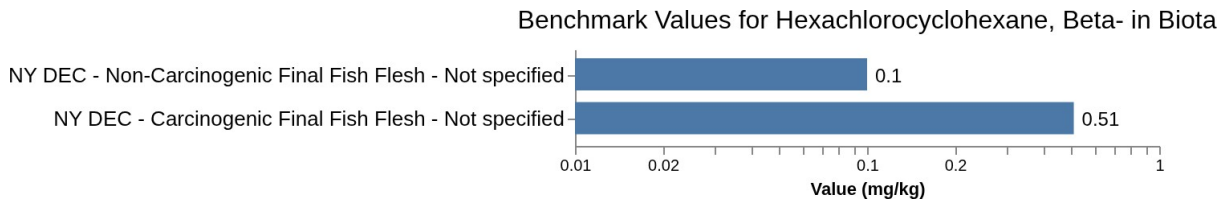


Table 47: Benchmark Values for Hexachlorocyclohexane, Delta− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
319−86−8	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.10	
319−86−8	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.51	

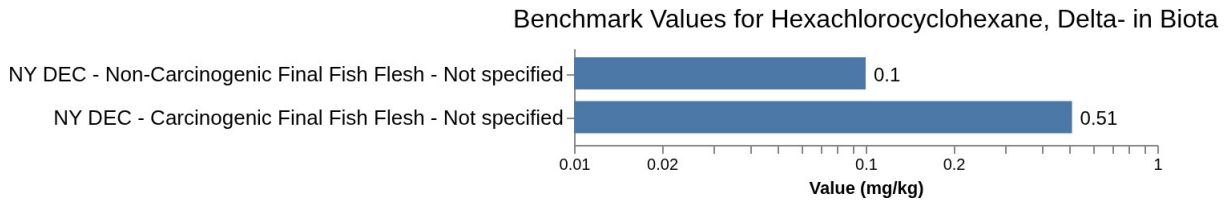


Table 48: Benchmark Values for Hexachlorocyclohexane, Gamma− (Lindane) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
58−89−9	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.10	
58−89−9	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.51	

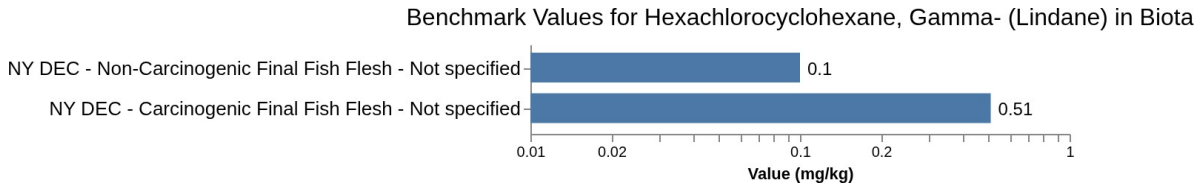


Table 49: Benchmark Values for Hexachlorodibenzofuran, 1,2,3,4,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
70648−26−9	Canada	Tissue Residue	Mammalian	7.100000e-08	45
70648−26−9	Canada	Tissue Residue	Avian	4.750000e-07	45

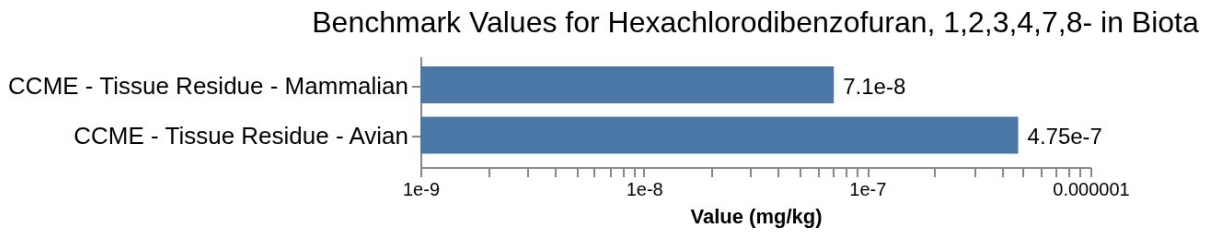


Table 50: Benchmark Values for Hexachlorodibenzo−p−dioxin, 1,2,3,4,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
39227−28−6	Canada	Tissue Residue	Mammalian	7.100000e-08	45
39227−28−6	Canada	Tissue Residue	Avian	2.375000e-07	45

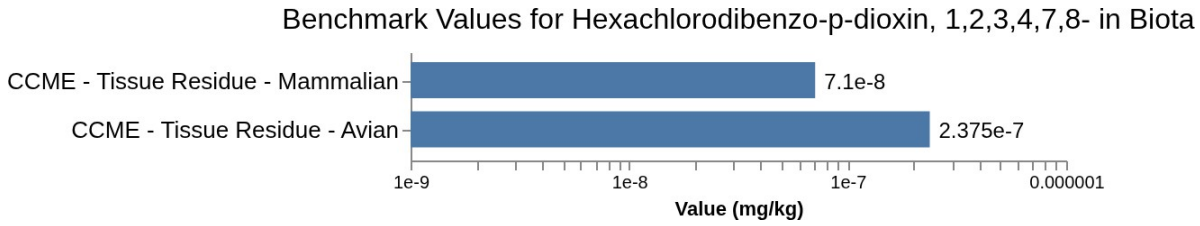


Table 51: Benchmark Values for Hexachloroethane in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
67−72−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	14.1	

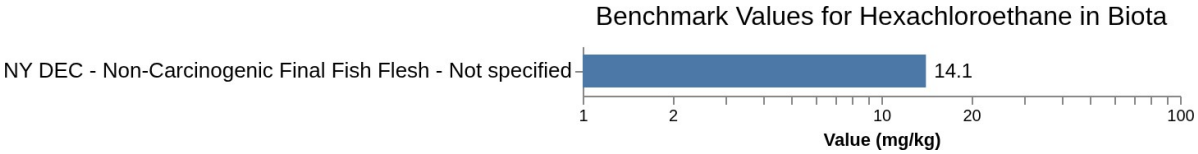


Table 52: Benchmark Values for HpCDD, 1,2,3,4,6,7,8,− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
35822−46−9	Canada	Tissue Residue	Avian	4.750000e-09	23, 45
35822−46−9	Canada	Tissue Residue	Mammalian	7.100000e-09	45

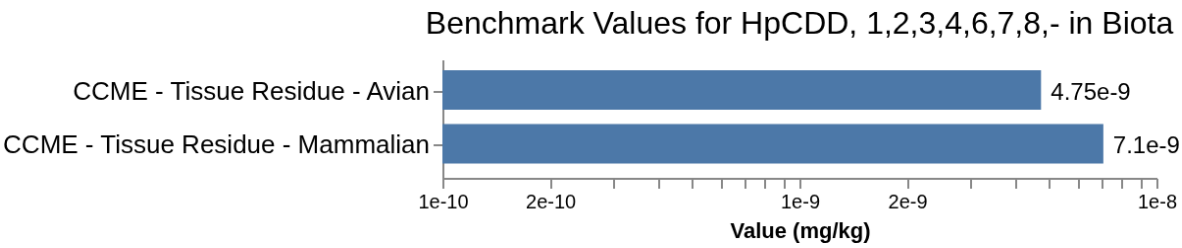


Table 53: Benchmark Values for HpCDF, 1,2,3,4,7,8,9− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
55673−89−7	Canada	Tissue Residue	Mammalian	7.100000e-09	45
55673−89−7	Canada	Tissue Residue	Avian	4.750000e-08	45

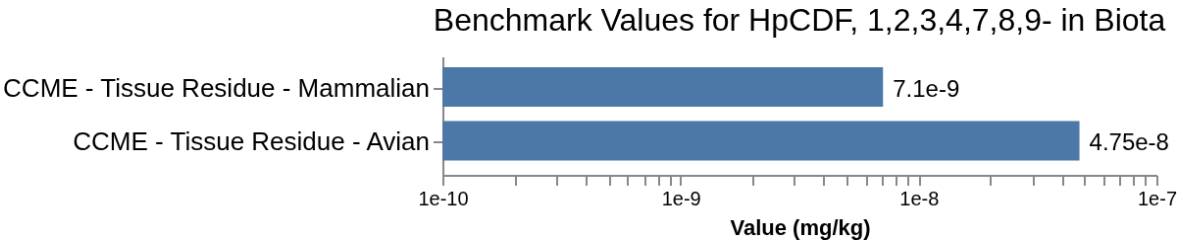


Table 54: Benchmark Values for HxCDD, 1,2,3,6,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57653−85−7	Canada	Tissue Residue	Avian	4.750000e-08	45
57653−85−7	Canada	Tissue Residue	Mammalian	7.100000e-08	45

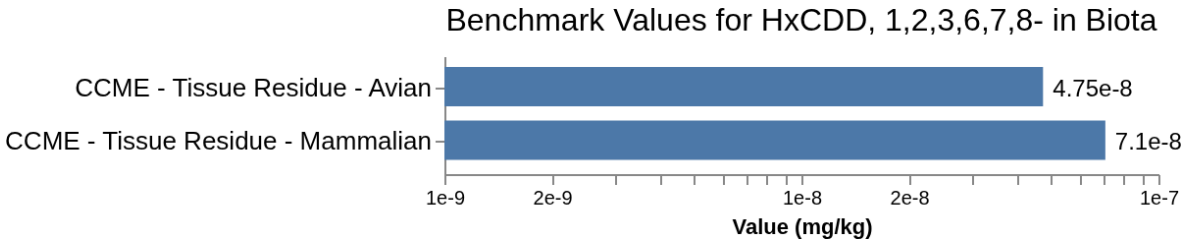


Table 55: Benchmark Values for HxCDF, 1,2,3,6,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57117−44−9	Canada	Tissue Residue	Mammalian	7.100000e-08	45
57117−44−9	Canada	Tissue Residue	Avian	4.750000e-07	45

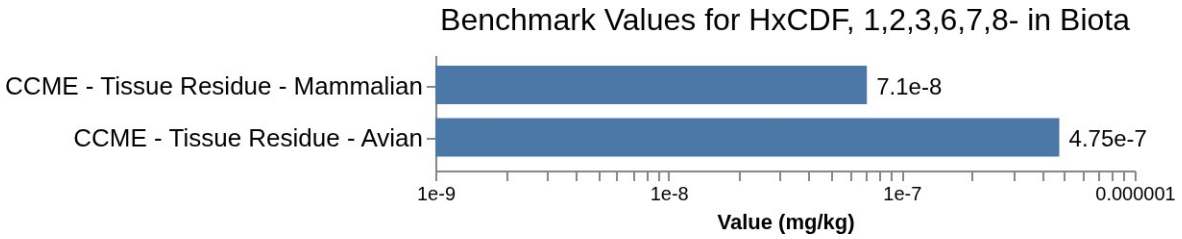


Table 56: Benchmark Values for HxCDF, 1,2,3,7,8,9− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
72918−21−9	Canada	Tissue Residue	Mammalian	7.100000e-08	45
72918−21−9	Canada	Tissue Residue	Avian	4.750000e-07	45

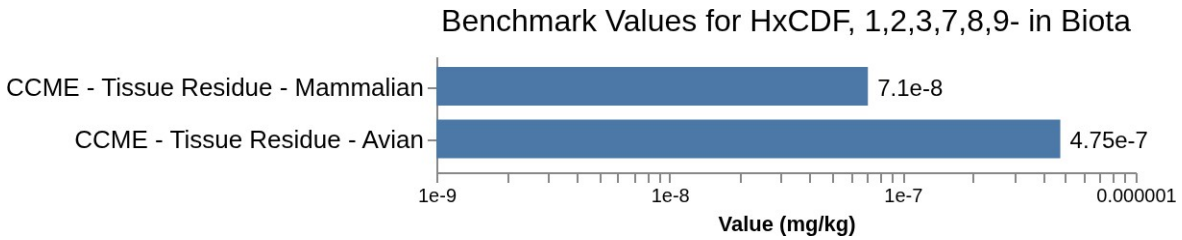


Table 57: Benchmark Values for HxCDF, 2,3,4,6,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
60851−34−5	Canada	Tissue Residue	Mammalian	7.100000e-08	45
60851−34−5	Canada	Tissue Residue	Avian	4.750000e-07	45

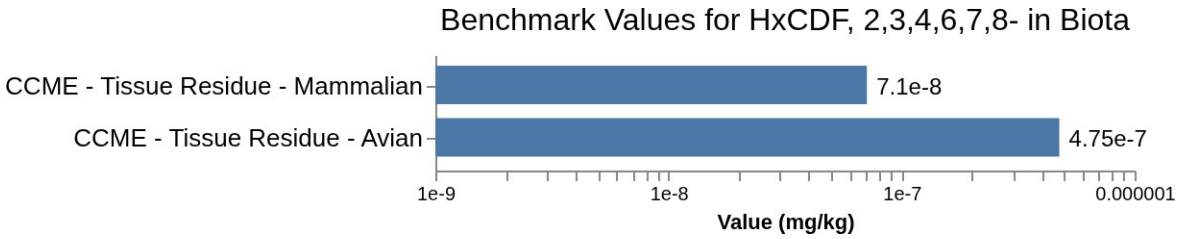


Table 58: Benchmark Values for Lead and Compounds in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
7439−92−1	SETAC ECW	Avian Blood	Not specified	0.2	
7439−92−1	SETAC ECW	Mammal Blood	Not specified	0.2	
7439−92−1	SETAC ECW	Avian Liver	Not specified	2.0	
7439−92−1	SETAC ECW	Avian Kidney	Not specified	3.0	
7439−92−1	SETAC ECW	Avian Bone	Not specified	10.0	

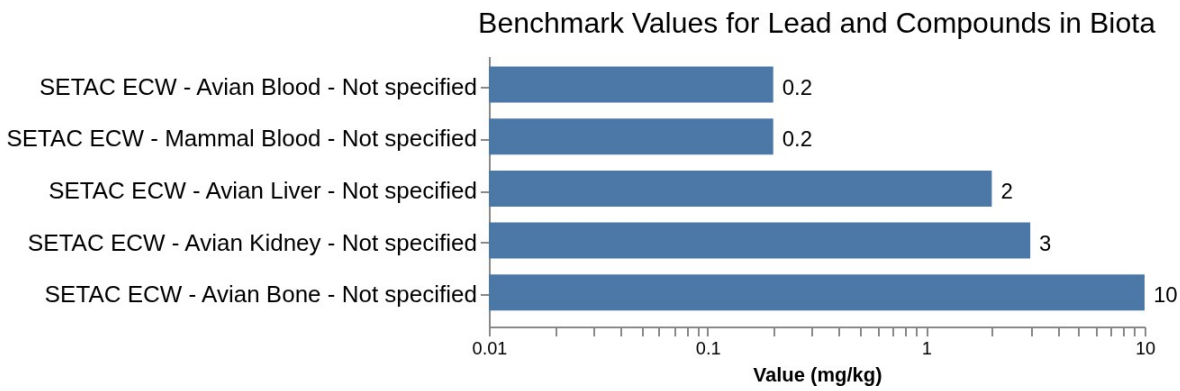


Table 59: Benchmark Values for Mercury (elemental) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
7439−97−6	Canada	Tissue Residue	Not specified		35
7439−97−6	SETAC ECW	Fish Egg	Not specified	0.07	
7439−97−6	SETAC ECW	Avian Egg	Not specified	0.5	
7439−97−6	SETAC ECW	Fish Whole Body	Not specified	3	
7439−97−6	SETAC ECW	Fish Muscle	Not specified	5	
7439−97−6	SETAC ECW	Fish Brain	Not specified	5	
7439−97−6	SETAC ECW	Avian Diet	Not specified	10	
7439−97−6	SETAC ECW	Avian Liver	Not specified	20	
7439−97−6	SETAC ECW	Avian Kidney	Not specified	20	
7439−97−6	SETAC ECW	Mammal Kidney	Not specified	30	
7439−97−6	SETAC ECW	Mammal Liver	Not specified	30	

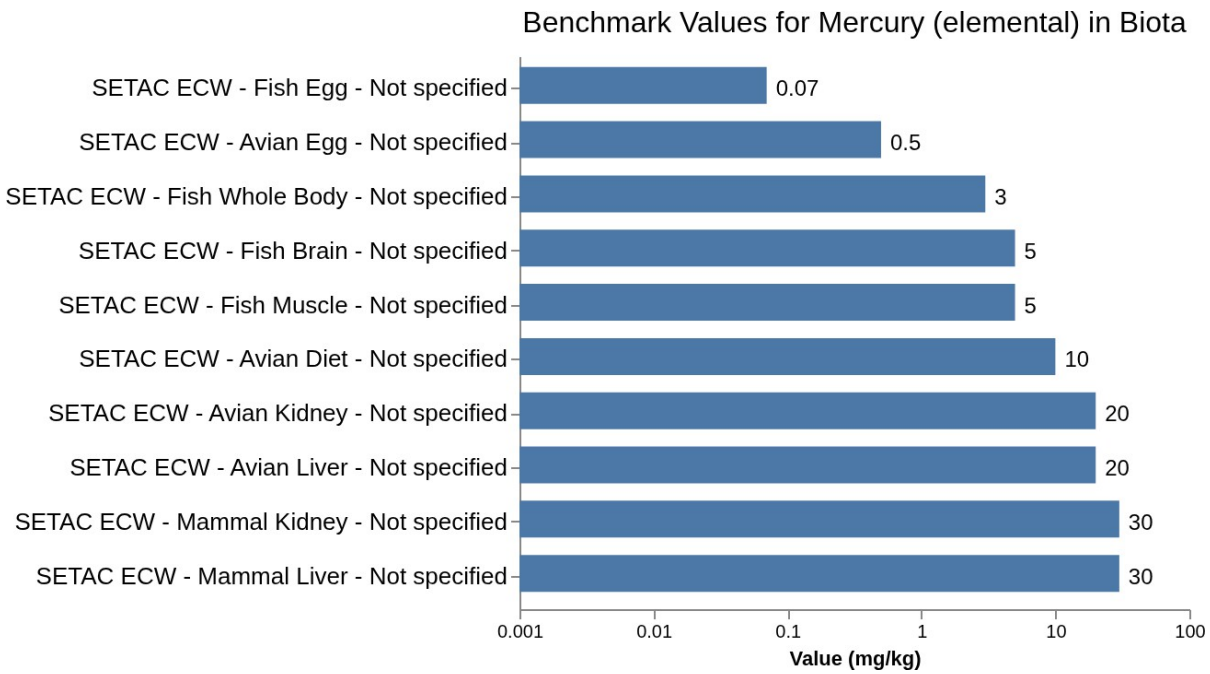


Table 60: Benchmark Values for Methoxychlor in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
72−43−5	SETAC ECW	Avian Egg	Not specified	17.0	

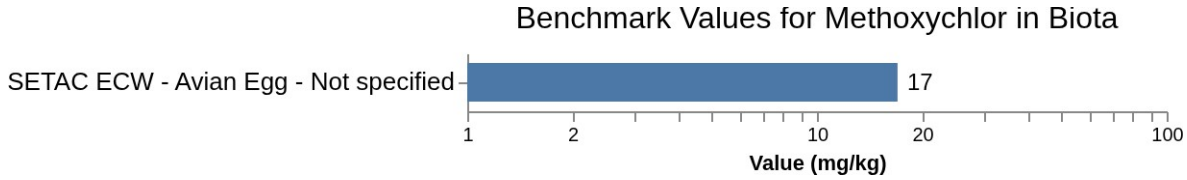


Table 61: Benchmark Values for Methyl Mercury in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
22967−92−6	British Columbia	Dietary Tissue LTC	Not specified	0.033	148
22967−92−6	Canada	Tissue Residue	Not specified	0.033	

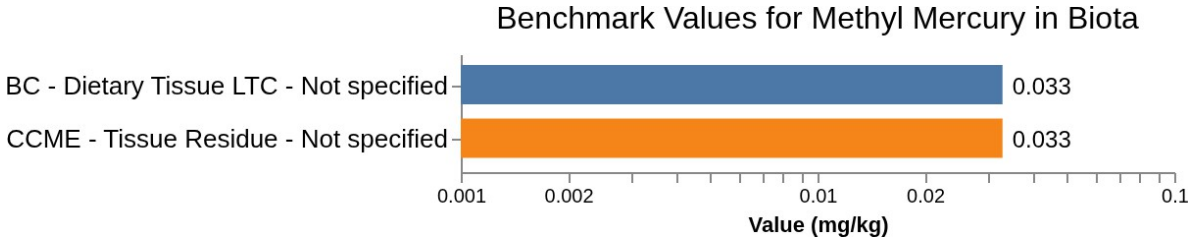


Table 62: Benchmark Values for Mirex in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
2385−85−5	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.33	
2385−85−5	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.37	
2385−85−5	SETAC ECW	Avian Egg	Not specified	20.00	

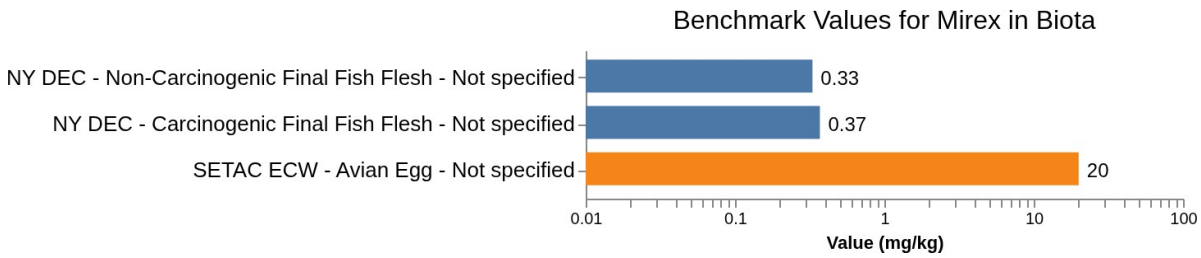


Table 63: Benchmark Values for OCDD in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
3268−87−9	Canada	Tissue Residue	Mammalian	7.100000e-11	45
3268−87−9	Canada	Tissue Residue	Avian	4.750000e-10	45

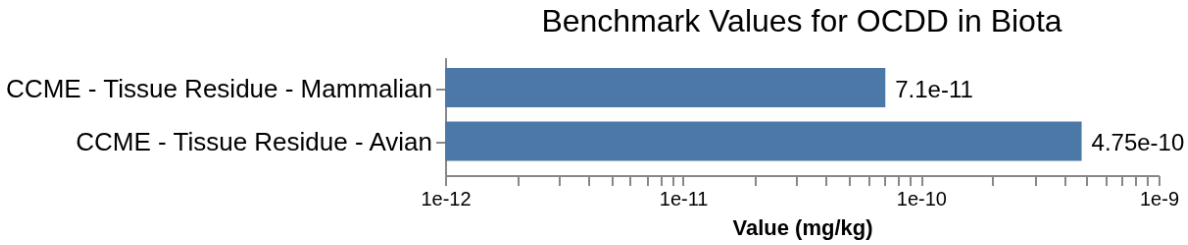


Table 64: Benchmark Values for OCDF in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
39001−02−0	Canada	Tissue Residue	Mammalian	7.100000e-11	45
39001−02−0	Canada	Tissue Residue	Avian	4.750000e-10	45

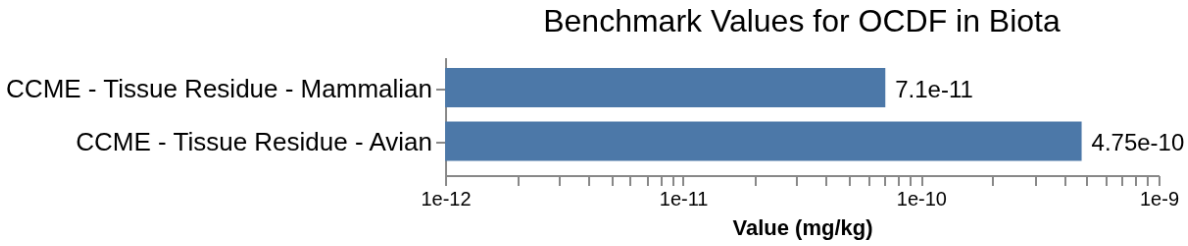


Table 65: Benchmark Values for Octabromodiphenyl Ether in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
32536−52−0	ECC Canada	Wildlife Dietary LTC	Not specified	0.063	

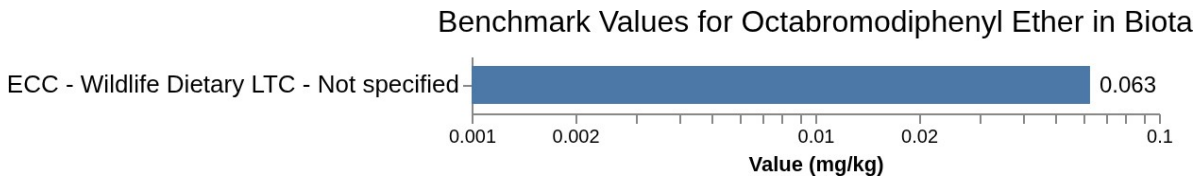


Table 66: Benchmark Values for Octachlorostyrene in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
29082−74−4	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.02	

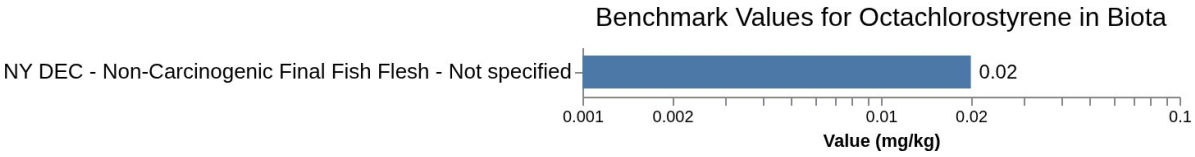


Table 67: Benchmark Values for PeCDF, 1,2,3,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57117−41−6	Canada	Tissue Residue	Mammalian	3.550000e-08	45
57117−41−6	Canada	Tissue Residue	Avian	4.750000e-07	45

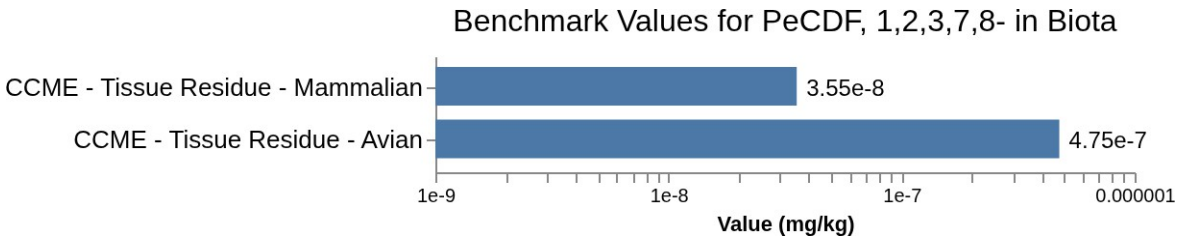


Table 68: Benchmark Values for PeCDF, 2,3,4,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57117−31−4	Canada	Tissue Residue	Mammalian	3.550000e-07	45
57117−31−4	Canada	Tissue Residue	Avian	4.750000e-06	45

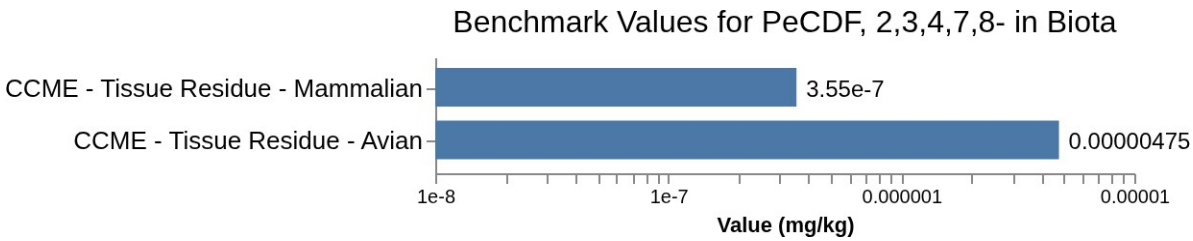


Table 69: Benchmark Values for Pentabromodiphenyl Ether in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
32534−81−9	ECC Canada	Freshwater LTC	Not specified	0.001	
32534−81−9	ECC Canada	Marine LTC	Not specified	0.001	
32534−81−9	ECC Canada	Wildlife Dietary LTC	Not specified	0.003	

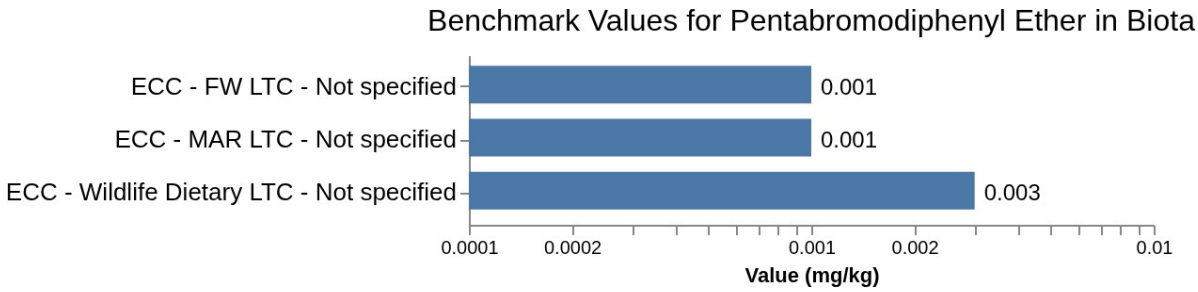


Table 70: Benchmark Values for Pentachlorobiphenyl, 2',3,4,4',5− (PCB 123) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
65510−44−3	Canada	Tissue Residue	Avian	2.400000e-11	45
65510−44−3	Canada	Tissue Residue	Mammalian	7.900000e-11	45

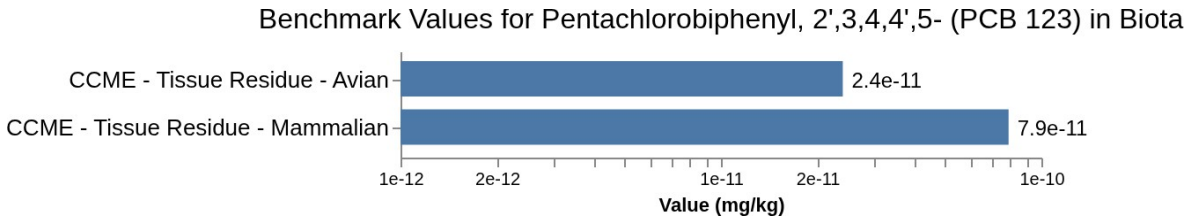


Table 71: Benchmark Values for Pentachlorobiphenyl, 2,3',4,4',5− (PCB 118) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
31508−00−6	Canada	Tissue Residue	Avian	2.400000e-11	45
31508−00−6	Canada	Tissue Residue	Mammalian	7.900000e-11	45

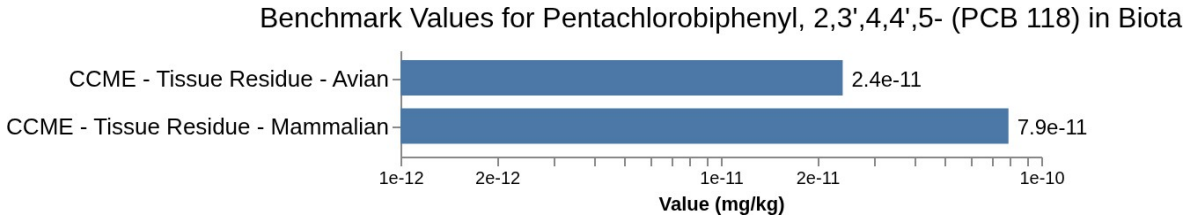


Table 72: Benchmark Values for Pentachlorobiphenyl, 2,3,3',4,4'− (PCB 105) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
32598−14−4	Canada	Tissue Residue	Mammalian	7.900000e-11	45
32598−14−4	Canada	Tissue Residue	Avian	2.400000e-10	45

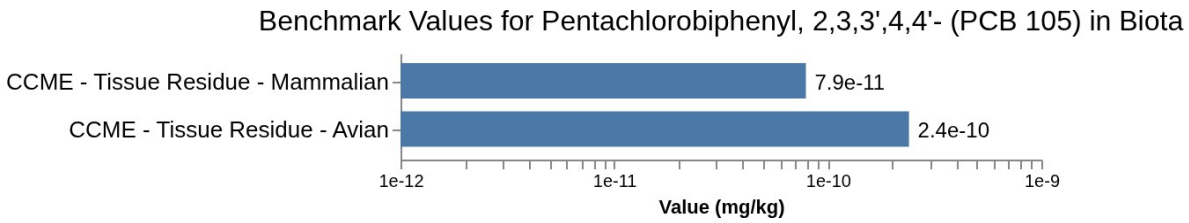


Table 73: Benchmark Values for Pentachlorobiphenyl, 2,3,4,4',5− (PCB 114) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
74472−37−0	Canada	Tissue Residue	Avian	2.400000e-10	45
74472−37−0	Canada	Tissue Residue	Mammalian	3.950000e-10	45

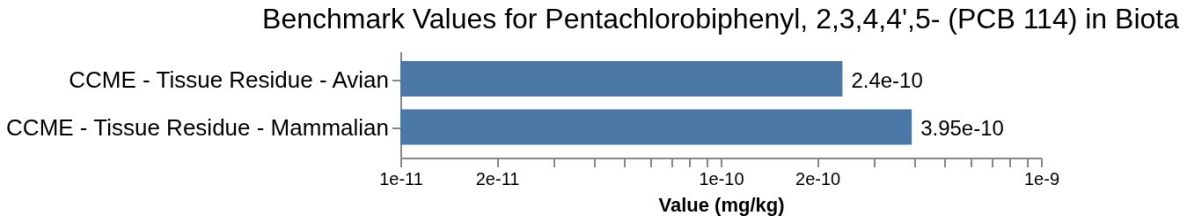


Table 74: Benchmark Values for Pentachlorobiphenyl, 3,3',4,4',5− (PCB 126) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
57465−28−8	Canada	Tissue Residue	Mammalian	7.900000e-08	45
57465−28−8	Canada	Tissue Residue	Avian	2.400000e-07	45

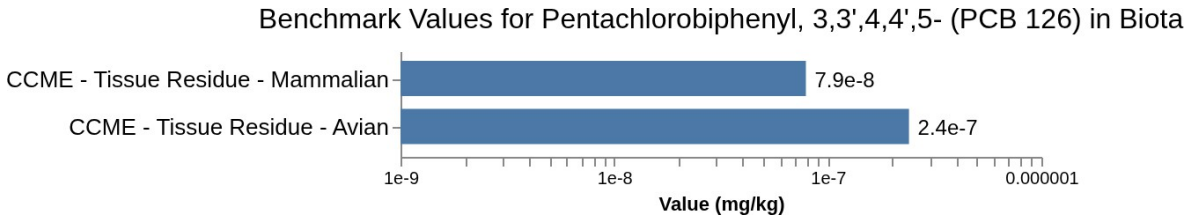


Table 75: Benchmark Values for Pentachlorodibenzo−p−dioxin, 1,2,3,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
40321−76−4	Canada	Tissue Residue	Mammalian	7.100000e-07	45
40321−76−4	Canada	Tissue Residue	Avian	4.750000e-06	45

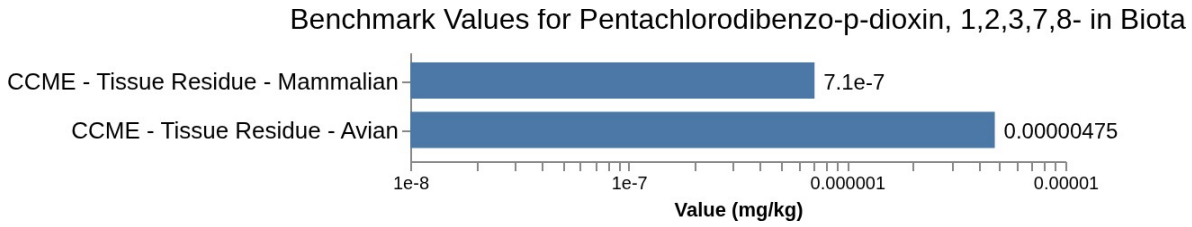


Table 76: Benchmark Values for Pentachlorophenol in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
87−86−5	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	2.0	

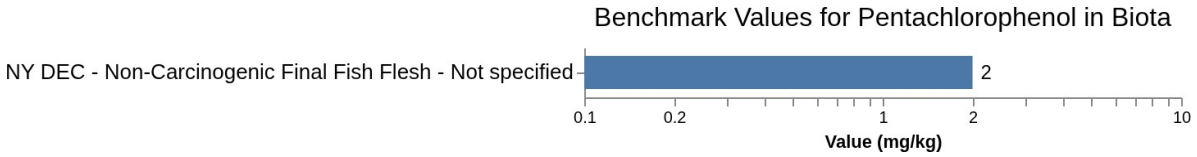


Table 77: Benchmark Values for Perfluorooctanesulfonate in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
45298−90−6	ECC Canada	Wildlife Dietary LTC	Not specified	0.0046	
45298−90−6	ECC Canada	Freshwater LTC	Not specified	4.7000	
45298−90−6	ECC Canada	Marine LTC	Not specified	4.7000	

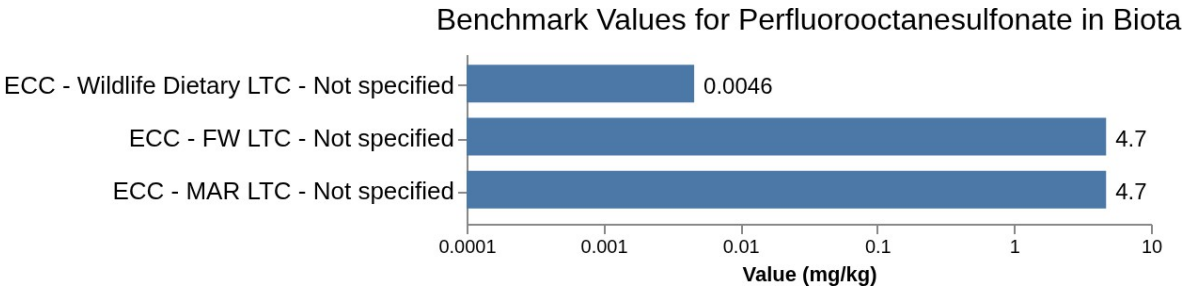


Table 78: Benchmark Values for Polybrominated Diphenyl Ethers (PBDE) (heptaBDE) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
68928−80−3	ECC Canada	Wildlife Dietary LTC	Not specified	0.064	

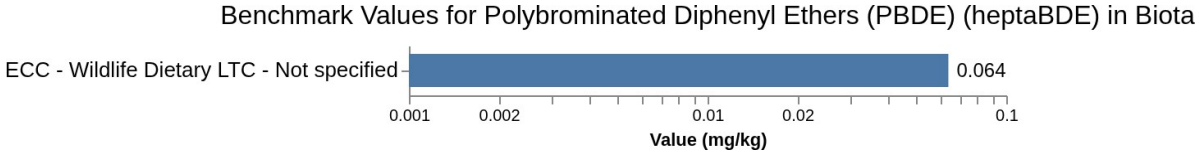


Table 79: Benchmark Values for Polybrominated Diphenyl Ethers (PBDE) (hexaBDE) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
36483−60−0	ECC Canada	Wildlife Dietary LTC	Not specified	0.004	
36483−60−0	ECC Canada	Marine LTC	Not specified	0.420	
36483−60−0	ECC Canada	Freshwater LTC	Not specified	0.420	

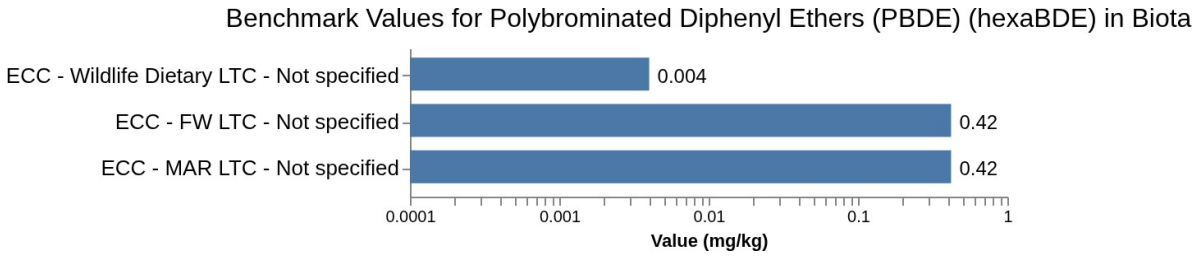


Table 80: Benchmark Values for Polybrominated Diphenyl Ethers (PBDE) (nonaBDE) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
63936−56−1	ECC Canada	Wildlife Dietary LTC	Not specified	0.078	

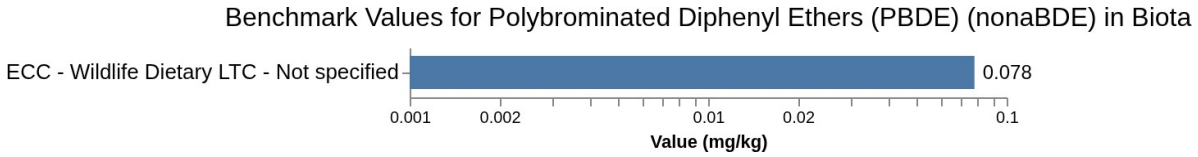


Table 81: Benchmark Values for Polybrominated Diphenyl Ethers (PBDE) (tetraBDE) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
40088−47−9	ECC Canada	Wildlife Dietary LTC	Not specified	0.044	
40088−47−9	ECC Canada	Marine LTC	Not specified	0.088	
40088−47−9	ECC Canada	Freshwater LTC	Not specified	0.088	

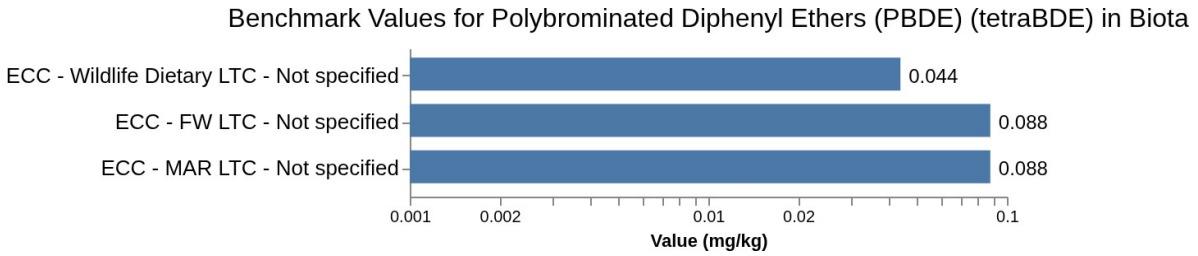


Table 82: Benchmark Values for Polychlorinated Biphenyls (high risk) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
1336−36−3	New York DEC	Carcinogenic Final Fish Flesh	Not specified	0.11	
1336−36−3	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.11	
1336−36−3	SETAC ECW	Mammal Liver	Not specified	4.00	
1336−36−3	SETAC ECW	Mammal Fat	Not specified	10.00	
1336−36−3	SETAC ECW	Fish Whole Body	Not specified	50.00	

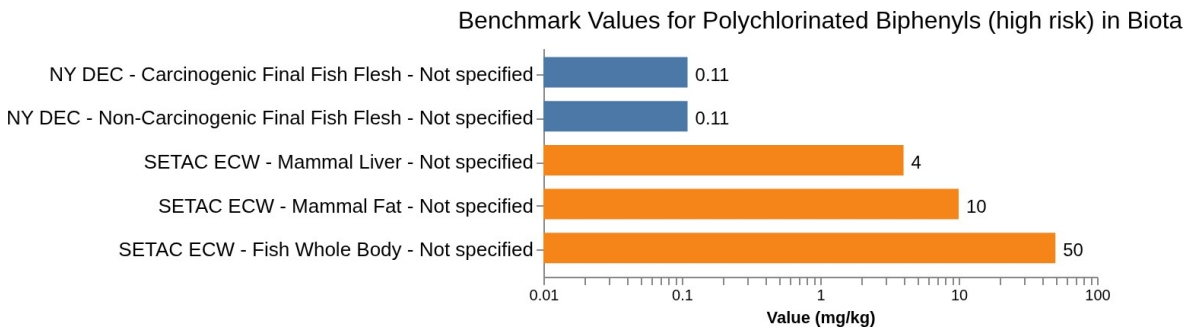


Table 83: Benchmark Values for Polychlorinated Biphenyls (PCBs) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
000000−17−0	British Columbia	Dietary Tissue STA	Not specified	0.10000	
000000−17−0	Canada	Dietary Tissue LTC	Not specified	0.00029	148

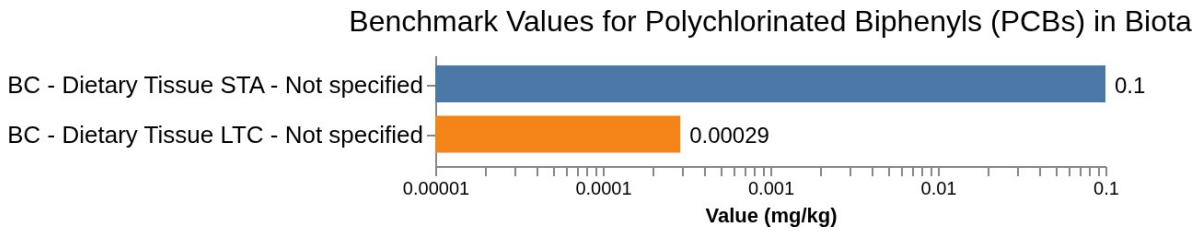


Table 84: Benchmark Values for Selenium in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
7782−49−2	British Columbia	Dietary Tissue LTC	Not specified	6.0	149
7782−49−2	British Columbia	Freshwater Dietary Tissue LTC	Not specified	11.0	135
7782−49−2	SETAC ECW	Avian Egg	Not specified	3.0	
7782−49−2	SETAC ECW	Avian Liver	Not specified	3.0	

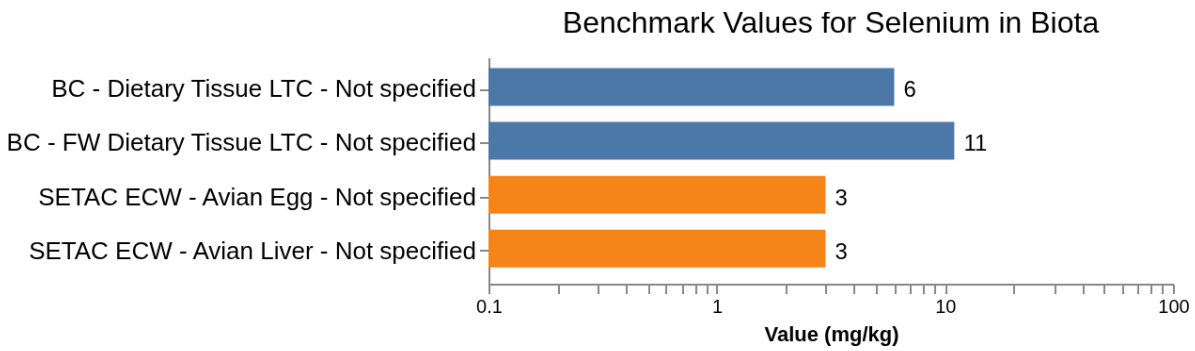


Table 85: Benchmark Values for TCDD, 2,3,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
1746−01−6	Canada	Tissue Residue	Mammalian	7.100000e-07	45
1746−01−6	Canada	Tissue Residue	Avian	4.750000e-06	45
1746−01−6	New York DEC	Carcinogenic Final Fish Flesh	Not specified	2.300000e-06	
1746−01−6	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	3.000000e-06	
1746−01−6	SETAC ECW	Fish Egg	Not specified	3.000000e-07	

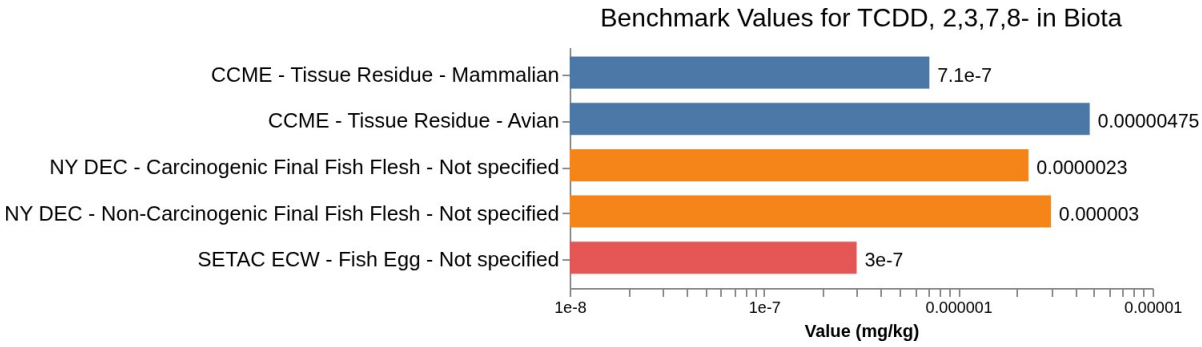


Table 86: Benchmark Values for TCDF, 2,3,7,8− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
51207−31−9	Canada	Tissue Residue	Mammalian	7.100000e-08	45
51207−31−9	Canada	Tissue Residue	Avian	4.750000e-06	45

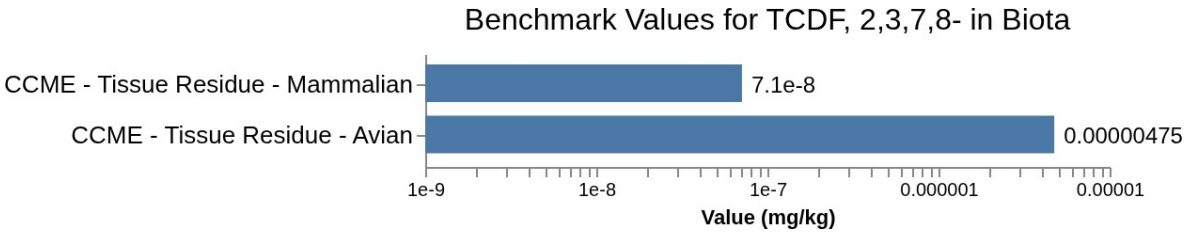


Table 87: Benchmark Values for Tetrachlorobiphenyl, 3,3',4,4'− (PCB 77) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
32598−13−3	Canada	Tissue Residue	Mammalian	7.900000e-11	45
32598−13−3	Canada	Tissue Residue	Avian	1.200000e-07	45

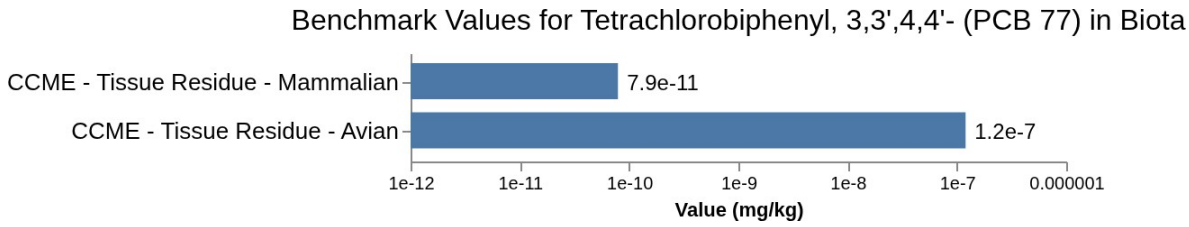


Table 88: Benchmark Values for Tetrachlorobiphenyl, 3,4,4',5− (PCB 81) in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
70362−50−4	Canada	Tissue Residue	Mammalian	7.900000e-11	45
70362−50−4	Canada	Tissue Residue	Avian	2.400000e-07	45

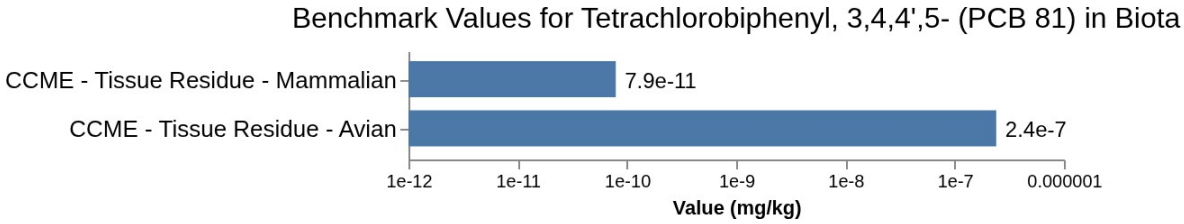


Table 89: Benchmark Values for Tetrachlorophenol, 2,3,4,6− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
58−90−2	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	0.67	

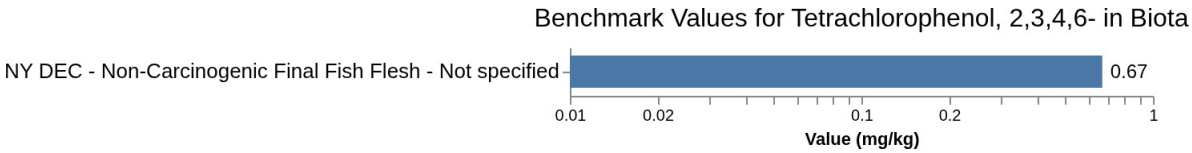


Table 90: Benchmark Values for Toxaphene in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
8001−35−2	Canada	Tissue Residue	Not specified	0.0063	
8001−35−2	SETAC ECW	Avian Carcass	Not specified	40.0000	
8001−35−2	SETAC ECW	Avian Egg	Not specified	50.0000	

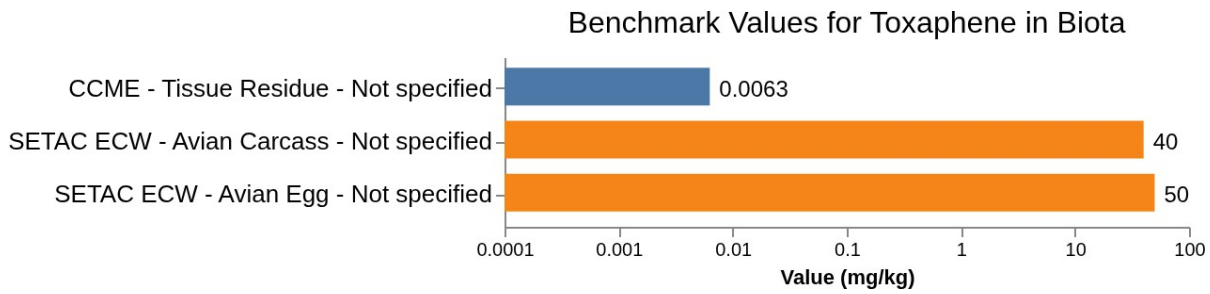


Table 91: Benchmark Values for Tribromodiphenyl Ether in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
49690−94−0	ECC Canada	Freshwater LTC	Not specified	0.12	
49690−94−0	ECC Canada	Marine LTC	Not specified	0.12	

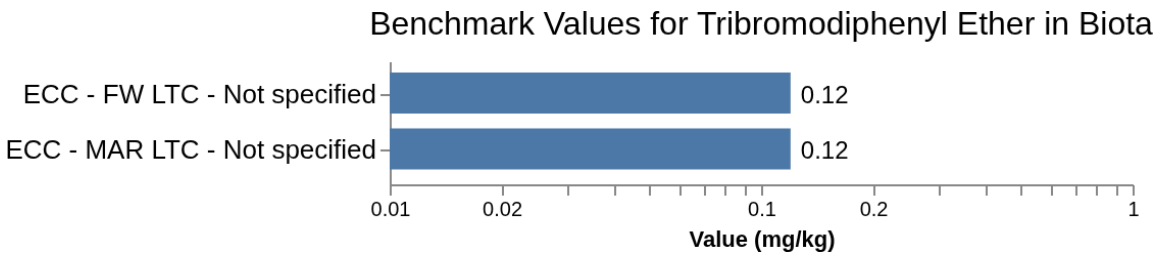


Table 92: Benchmark Values for Trichlorobenzene, 1,2,4− in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
120−82−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	1.33	

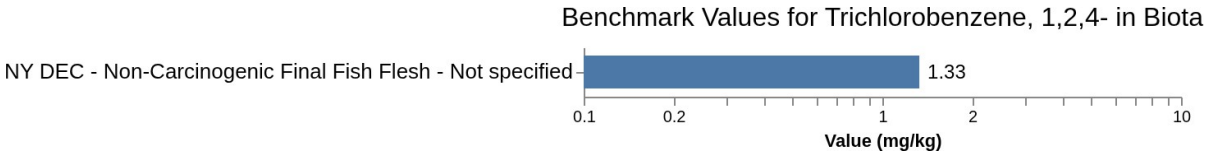
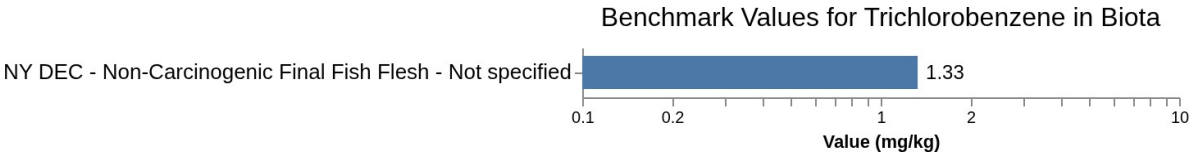


Table 93: Benchmark Values for Trichlorobenzene in Biota

CAS	Source	Benchmark	Organism	Value (mg/kg)	Footnotes
12002−48−1	New York DEC	Non−Carcinogenic Final Fish Flesh	Not specified	1.33	



7. RADIONUCLIDE BENCHMARKS FOR SEDIMENT

Table 94: Benchmark Values for Am−241 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	5000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	1000	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	4300	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	10000	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	43000	
LANL ECORISK	Rad Sediment No Effect	Algae	66000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	66000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	66000	
LANL ECORISK	Rad Sediment No Effect	Fish	66000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	660000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	660000	
LANL ECORISK	Rad Sediment Low Effect	Fish	660000	
LANL ECORISK	Rad Sediment Low Effect	Algae	660000	

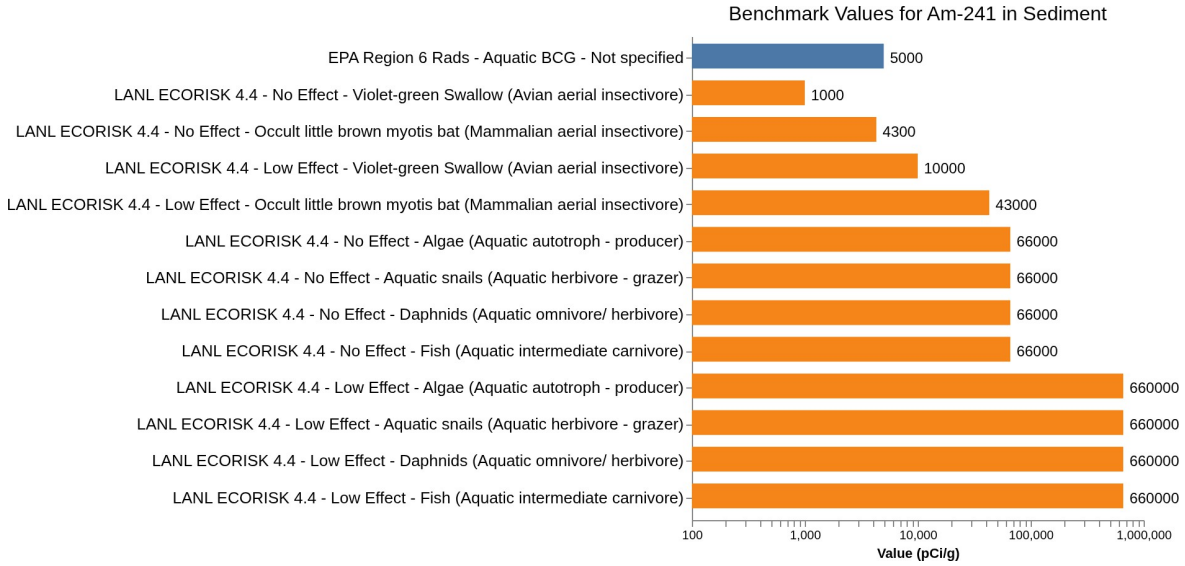


Table 95: Benchmark Values for Ce−144 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	3000	

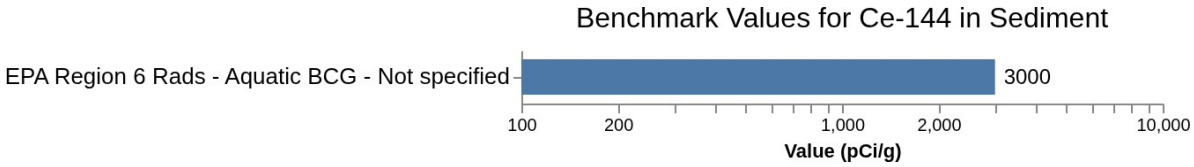


Table 96: Benchmark Values for Co−60 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	1000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	210	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	950	
LANL ECORISK	Rad Sediment No Effect	Algae	1400	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	1400	
LANL ECORISK	Rad Sediment No Effect	Daphnids	1400	
LANL ECORISK	Rad Sediment No Effect	Fish	1400	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	2100	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	9500	
LANL ECORISK	Rad Sediment Low Effect	Algae	14000	
LANL ECORISK	Rad Sediment Low Effect	Fish	14000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	14000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	14000	

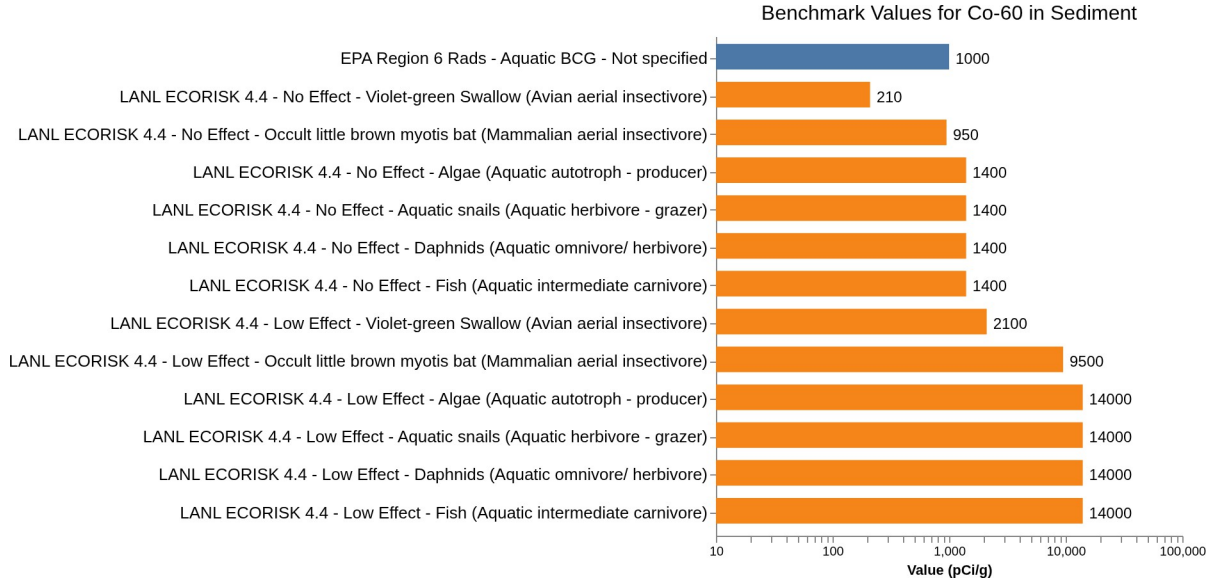


Table 97: Benchmark Values for Cs−134 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	330	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	1500	
LANL ECORISK	Rad Sediment No Effect	Fish	2200	
LANL ECORISK	Rad Sediment No Effect	Daphnids	2200	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	2200	
LANL ECORISK	Rad Sediment No Effect	Algae	2200	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	3300	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	15000	
LANL ECORISK	Rad Sediment Low Effect	Fish	22000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	22000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	22000	
LANL ECORISK	Rad Sediment Low Effect	Algae	22000	

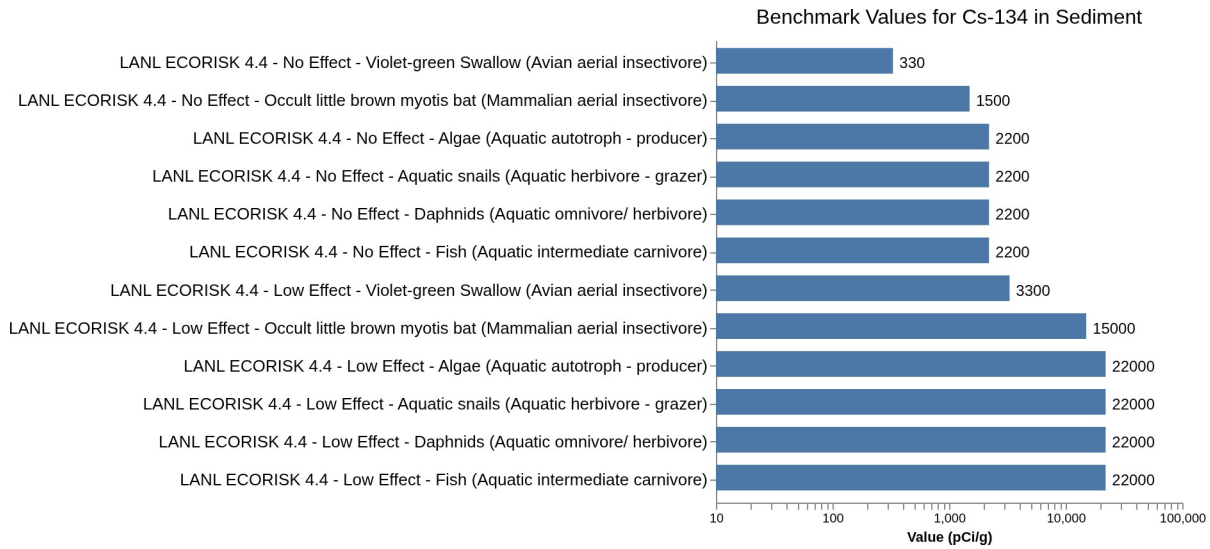


Table 98: Benchmark Values for Cs−135 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	40000	

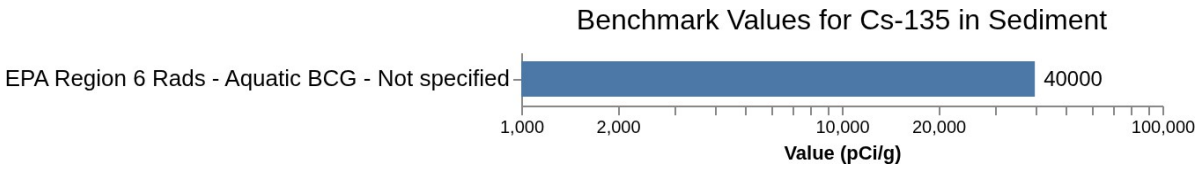


Table 99: Benchmark Values for Cs−137 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	3000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	740	1, 3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	3300	1
LANL ECORISK	Rad Sediment No Effect	Fish	5000	1
LANL ECORISK	Rad Sediment No Effect	Daphnids	5000	1
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	5000	1
LANL ECORISK	Rad Sediment No Effect	Algae	5000	1
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	7400	1, 3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	33000	1
LANL ECORISK	Rad Sediment Low Effect	Daphnids	50000	1
LANL ECORISK	Rad Sediment Low Effect	Fish	50000	1
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	50000	1
LANL ECORISK	Rad Sediment Low Effect	Algae	50000	1

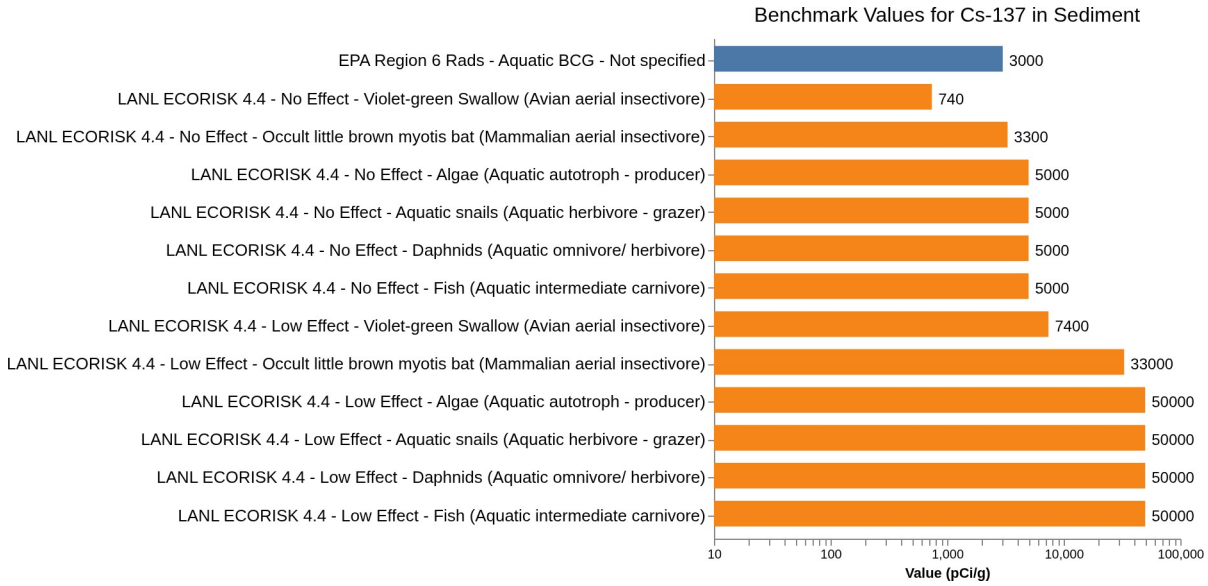


Table 100: Benchmark Values for Eu−152 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	3.500000e+01	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	1.500000e+02	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	3.500000e+02	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	1.500000e+03	
LANL ECORISK	Rad Sediment No Effect	Algae	2.600000e+19	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	2.600000e+19	
LANL ECORISK	Rad Sediment No Effect	Daphnids	2.600000e+19	
LANL ECORISK	Rad Sediment No Effect	Fish	2.600000e+19	
LANL ECORISK	Rad Sediment Low Effect	Algae	2.600000e+20	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	2.600000e+20	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	2.600000e+20	
LANL ECORISK	Rad Sediment Low Effect	Fish	2.600000e+20	

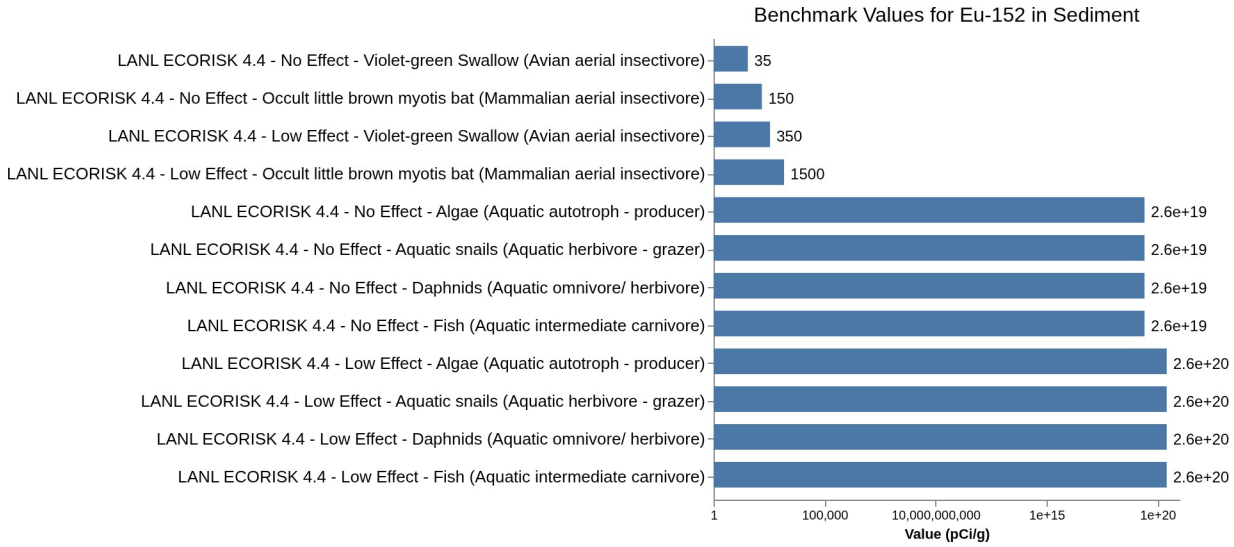


Table 101: Benchmark Values for Eu−154 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	3000	

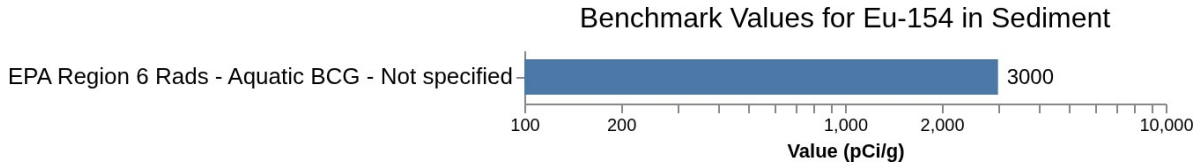


Table 102: Benchmark Values for Eu−155 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	30000	

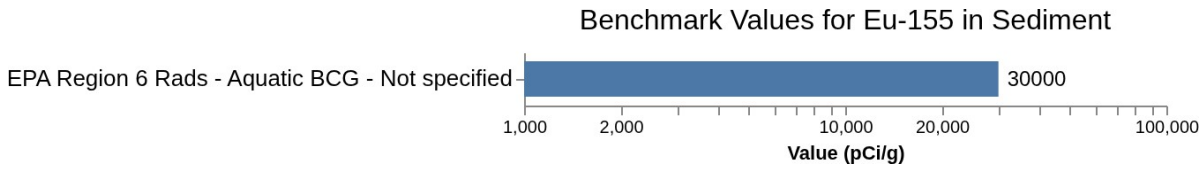


Table 103: Benchmark Values for H−3 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	400000	
LANL ECORISK	Rad Sediment No Effect	Algae	660000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	660000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	660000	3
LANL ECORISK	Rad Sediment No Effect	Fish	660000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	6.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	6.60e+06	3
LANL ECORISK	Rad Sediment Low Effect	Fish	6.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Algae	6.60e+06	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	2.90e+08	
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	1.30e+09	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	2.90e+09	
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	1.30e+10	

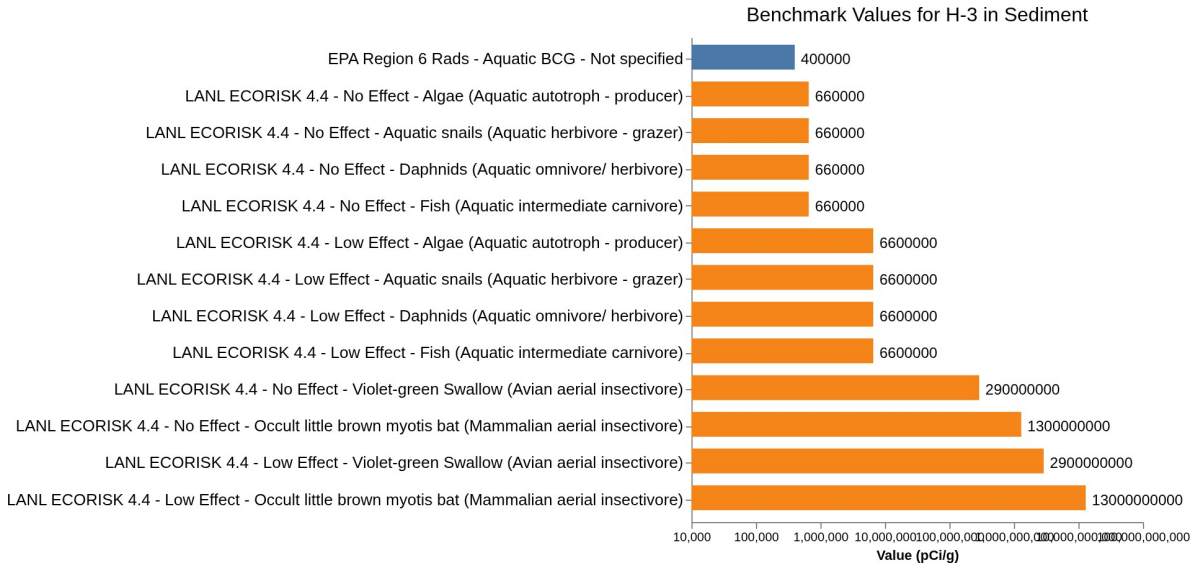


Table 104: Benchmark Values for I−129 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	30000	

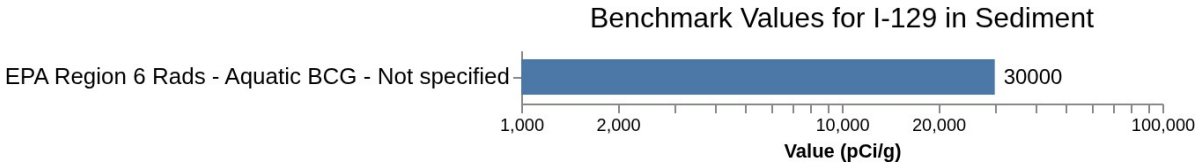


Table 105: Benchmark Values for I−131 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	5000	

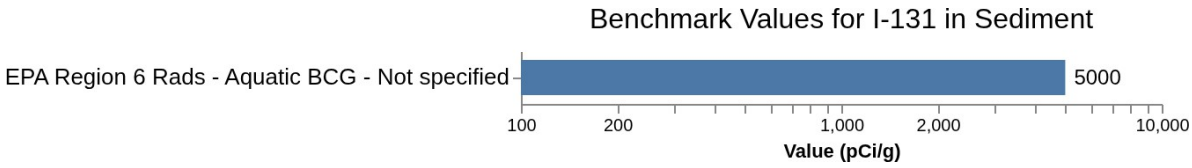


Table 106: Benchmark Values for Na−22 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	1.000000e+04	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	4.800000e+04	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	1.000000e+05	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	4.800000e+05	
LANL ECORISK	Rad Sediment No Effect	Fish	1.400000e+19	
LANL ECORISK	Rad Sediment No Effect	Daphnids	1.400000e+19	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	1.400000e+19	
LANL ECORISK	Rad Sediment No Effect	Algae	1.400000e+19	
LANL ECORISK	Rad Sediment Low Effect	Algae	1.400000e+20	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	1.400000e+20	
LANL ECORISK	Rad Sediment Low Effect	Fish	1.400000e+20	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	1.400000e+20	

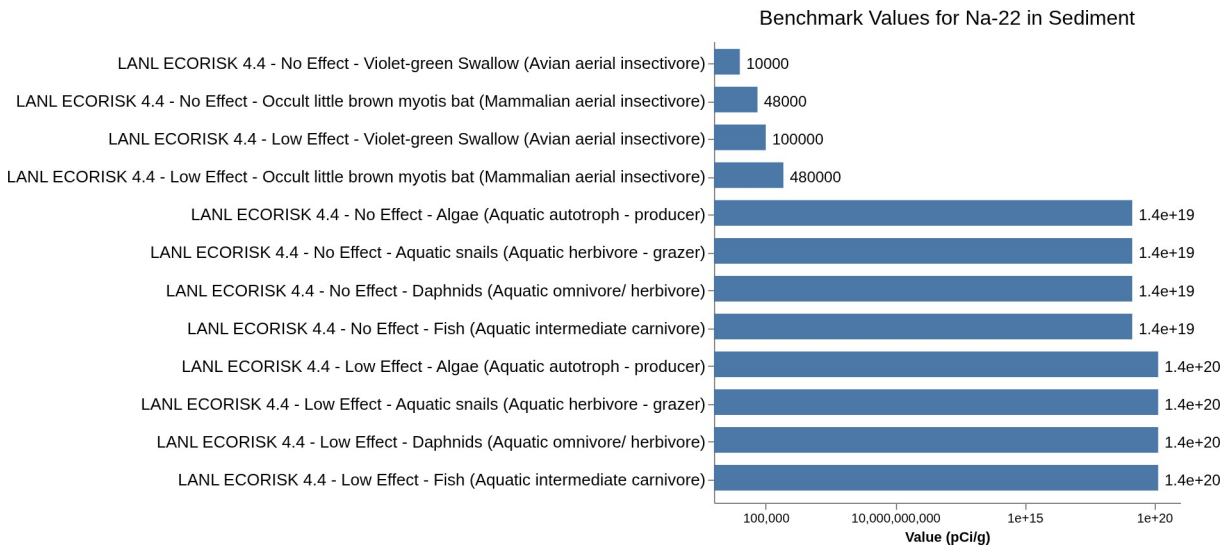


Table 107: Benchmark Values for Np−237 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	58	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	240	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	580	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	2400	
LANL ECORISK	Rad Sediment No Effect	Fish	7600	
LANL ECORISK	Rad Sediment No Effect	Daphnids	7600	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	7600	
LANL ECORISK	Rad Sediment No Effect	Algae	7600	
LANL ECORISK	Rad Sediment Low Effect	Algae	76000	
LANL ECORISK	Rad Sediment Low Effect	Fish	76000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	76000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	76000	

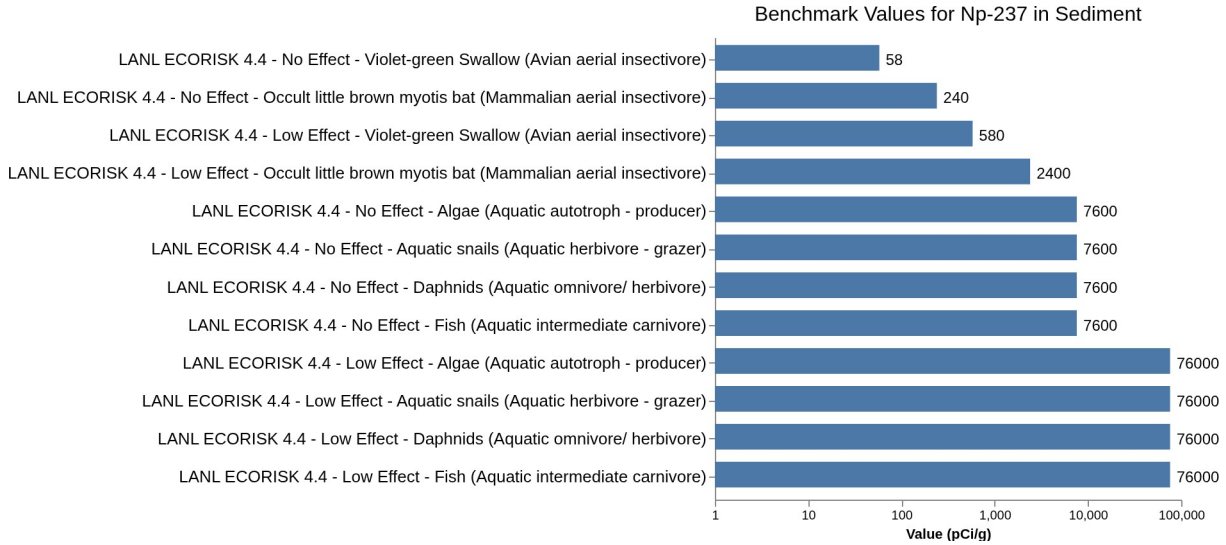


Table 108: Benchmark Values for Pb−210 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	2100	3
LANL ECORISK	Rad Sediment No Effect	Algae	9000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	9000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	9000	
LANL ECORISK	Rad Sediment No Effect	Fish	9000	
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	9200	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	21000	3
LANL ECORISK	Rad Sediment Low Effect	Fish	90000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	90000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	90000	
LANL ECORISK	Rad Sediment Low Effect	Algae	90000	
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	92000	

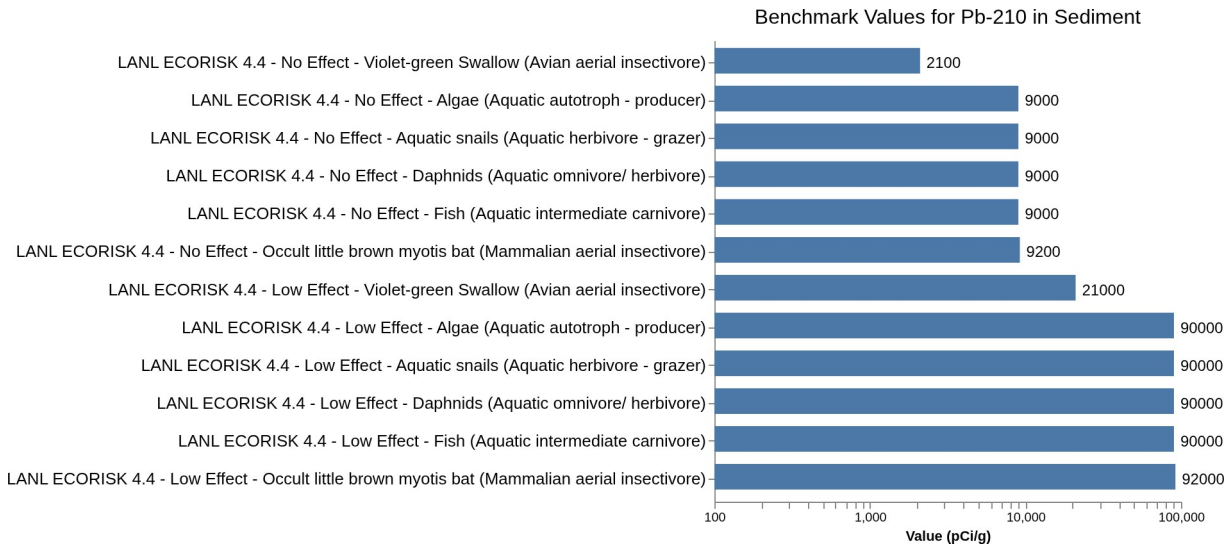


Table 109: Benchmark Values for Pu−238 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	510	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2100	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	5100	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	21000	
LANL ECORISK	Rad Sediment No Effect	Algae	400000	
LANL ECORISK	Rad Sediment No Effect	Fish	400000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	400000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	400000	
LANL ECORISK	Rad Sediment Low Effect	Fish	4.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	4.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	4.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Algae	4.00e+06	

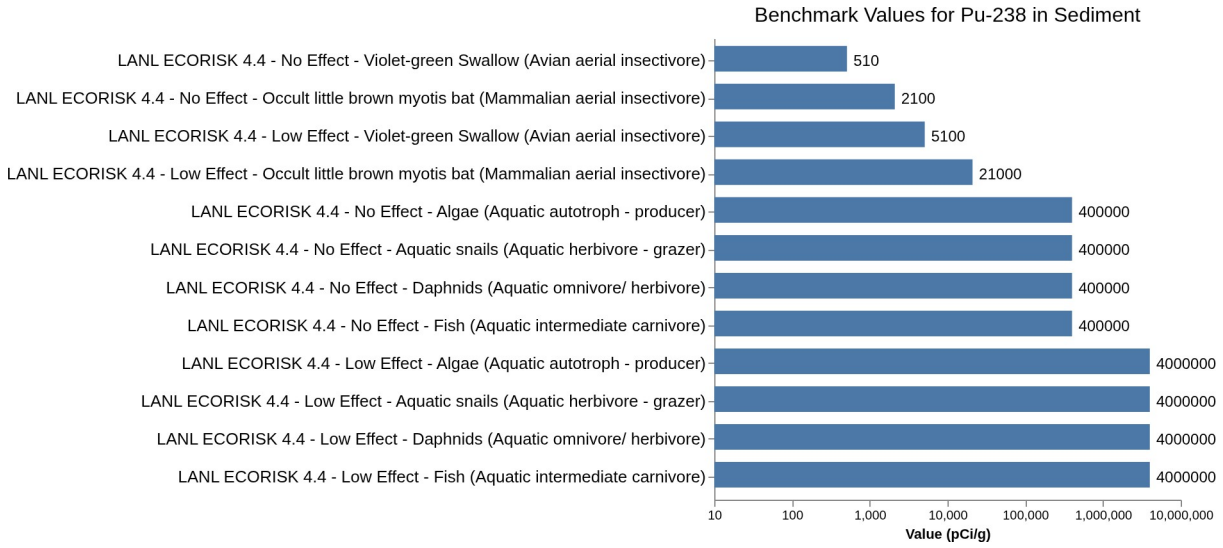


Table 110: Benchmark Values for Pu−239 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	6000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	540	3, 4
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2200	4
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	5400	3, 4
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	22000	4
LANL ECORISK	Rad Sediment No Effect	Fish	710000	4
LANL ECORISK	Rad Sediment No Effect	Daphnids	710000	4
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	710000	4
LANL ECORISK	Rad Sediment No Effect	Algae	710000	4
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	7.10e+06	4
LANL ECORISK	Rad Sediment Low Effect	Daphnids	7.10e+06	4
LANL ECORISK	Rad Sediment Low Effect	Fish	7.10e+06	4
LANL ECORISK	Rad Sediment Low Effect	Algae	7.10e+06	4

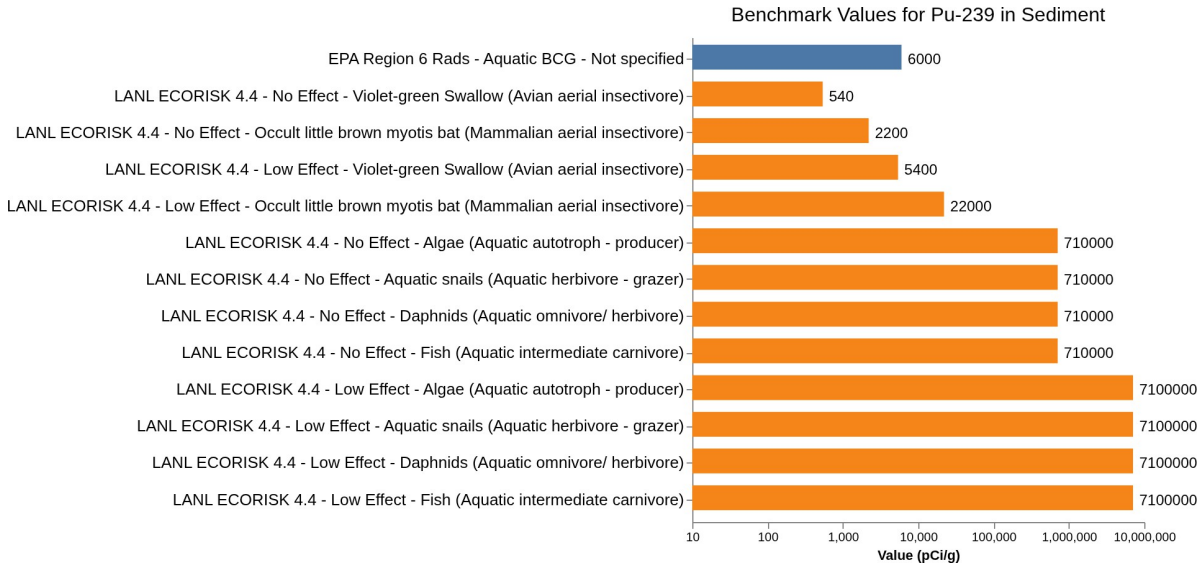


Table 111: Benchmark Values for Pu−241 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	270000	3
LANL ECORISK	Rad Sediment No Effect	Algae	760000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	760000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	760000	
LANL ECORISK	Rad Sediment No Effect	Fish	760000	
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	1.20e+06	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	2.70e+06	3
LANL ECORISK	Rad Sediment Low Effect	Algae	7.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	7.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	7.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Fish	7.60e+06	
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	1.20e+07	

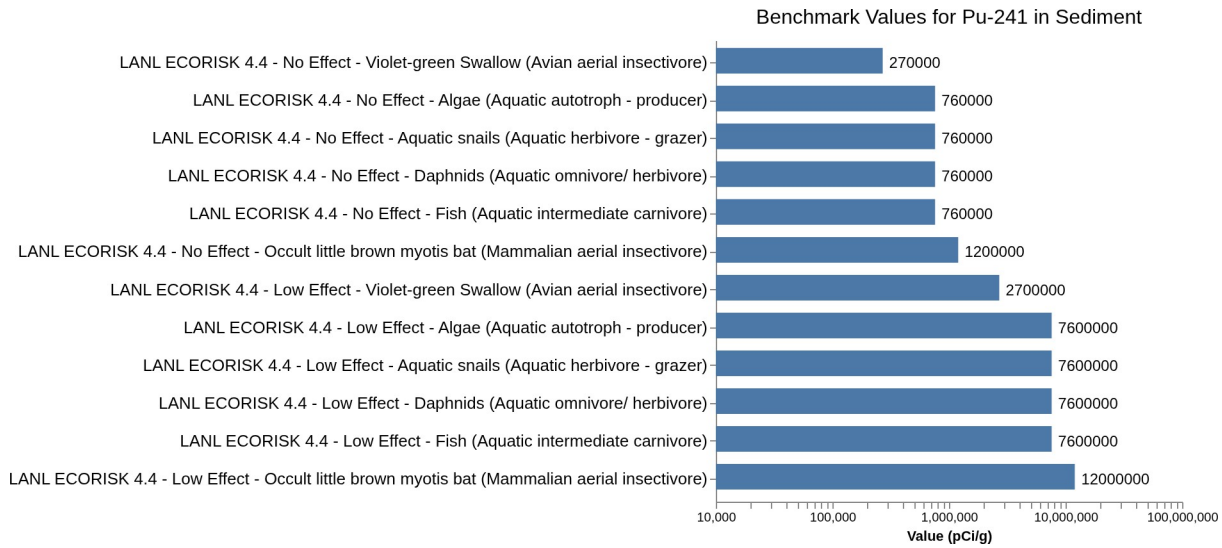


Table 112: Benchmark Values for Ra−226 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	100.00	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	0.96	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	4.00	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	9.60	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	40.00	
LANL ECORISK	Rad Sediment No Effect	Fish	1400.00	
LANL ECORISK	Rad Sediment No Effect	Daphnids	1400.00	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	1400.00	
LANL ECORISK	Rad Sediment No Effect	Algae	1400.00	
LANL ECORISK	Rad Sediment Low Effect	Algae	14000.00	
LANL ECORISK	Rad Sediment Low Effect	Fish	14000.00	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	14000.00	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	14000.00	

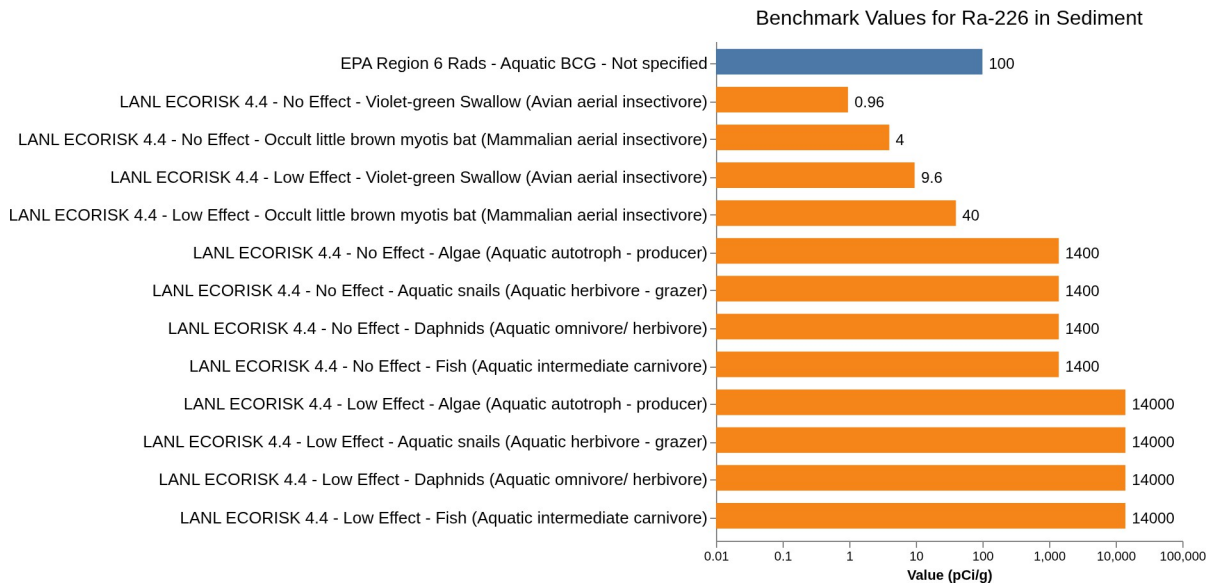


Table 113: Benchmark Values for Ra−228 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	90.00	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	0.88	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	3.70	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	8.80	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	37.00	
LANL ECORISK	Rad Sediment No Effect	Fish	2800.00	
LANL ECORISK	Rad Sediment No Effect	Daphnids	2800.00	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	2800.00	
LANL ECORISK	Rad Sediment No Effect	Algae	2800.00	
LANL ECORISK	Rad Sediment Low Effect	Fish	28000.00	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	28000.00	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	28000.00	
LANL ECORISK	Rad Sediment Low Effect	Algae	28000.00	

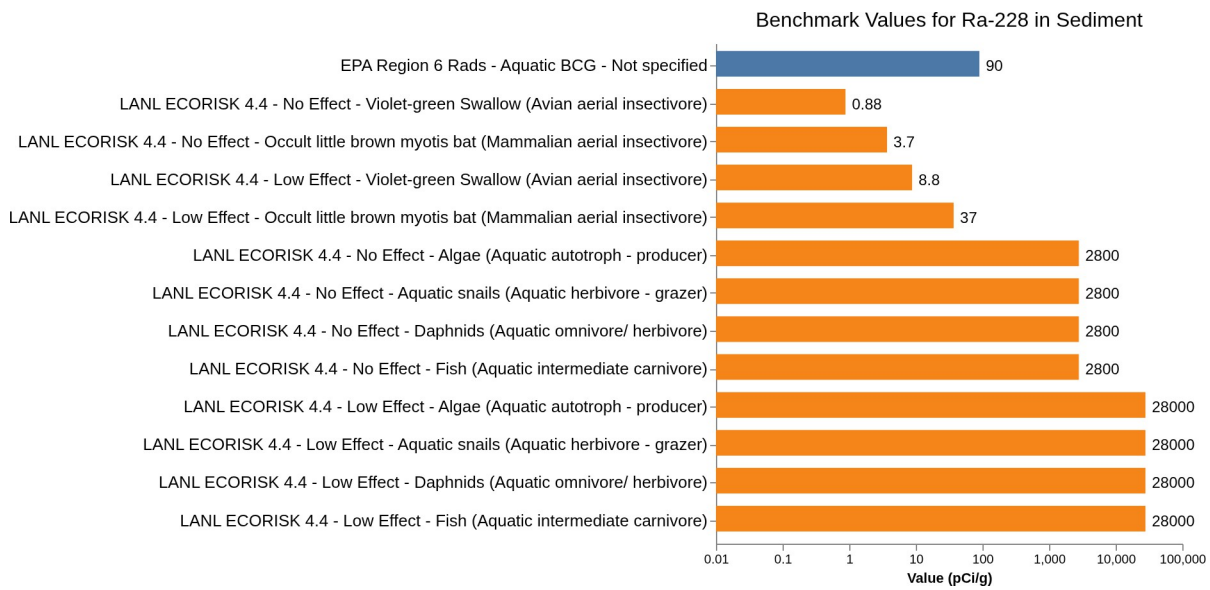


Table 114: Benchmark Values for Sb−125 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	7000	

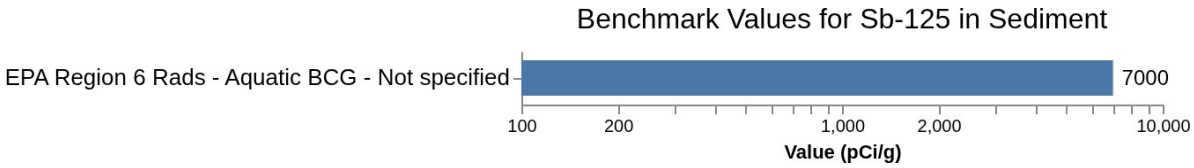


Table 115: Benchmark Values for Sr−90 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	600	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	650	2, 3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2700	2
LANL ECORISK	Rad Sediment No Effect	Algae	3400	2
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	3400	2
LANL ECORISK	Rad Sediment No Effect	Daphnids	3400	2
LANL ECORISK	Rad Sediment No Effect	Fish	3400	2
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6500	2, 3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	27000	2
LANL ECORISK	Rad Sediment Low Effect	Daphnids	34000	2
LANL ECORISK	Rad Sediment Low Effect	Fish	34000	2
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	34000	2
LANL ECORISK	Rad Sediment Low Effect	Algae	34000	2

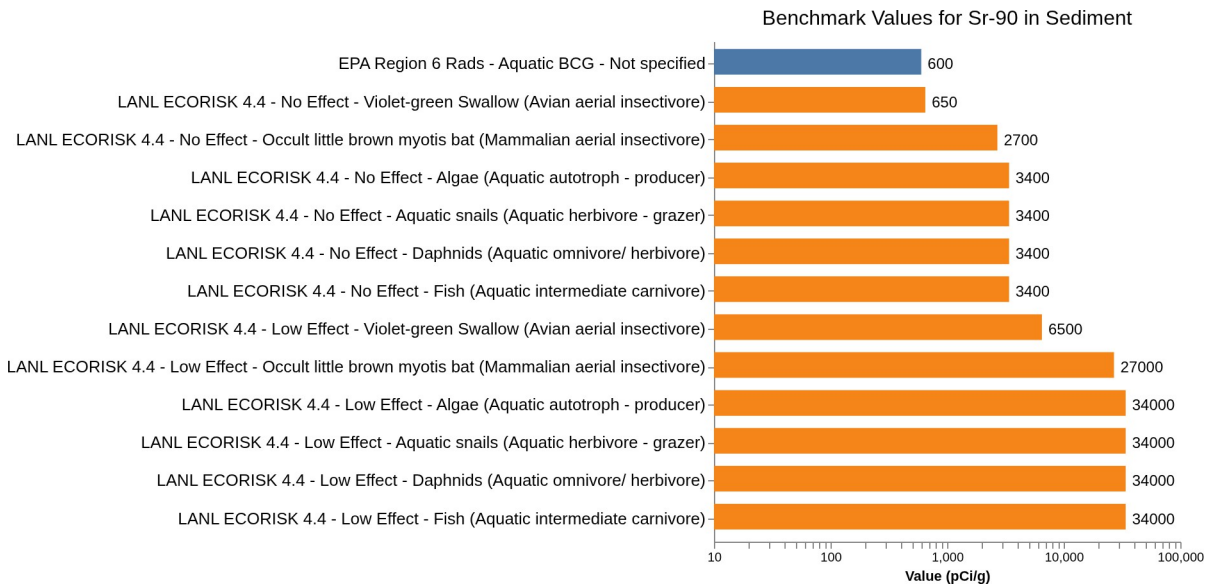


Table 116: Benchmark Values for Tc−99 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	40000	

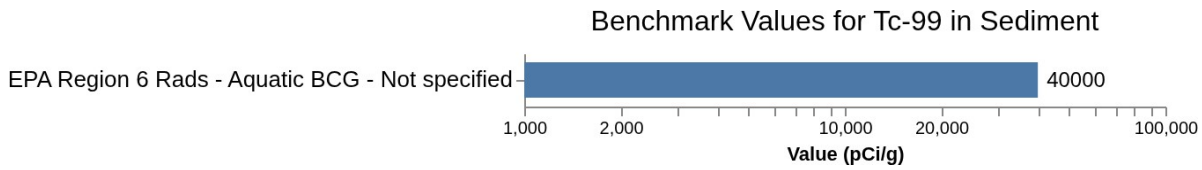


Table 117: Benchmark Values for Th−228 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	660	3
LANL ECORISK	Rad Sediment No Effect	Daphnids	1600	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	1600	
LANL ECORISK	Rad Sediment No Effect	Algae	1600	
LANL ECORISK	Rad Sediment No Effect	Fish	1600	
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2800	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6600	3
LANL ECORISK	Rad Sediment Low Effect	Daphnids	16000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	16000	
LANL ECORISK	Rad Sediment Low Effect	Algae	16000	
LANL ECORISK	Rad Sediment Low Effect	Fish	16000	
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	28000	

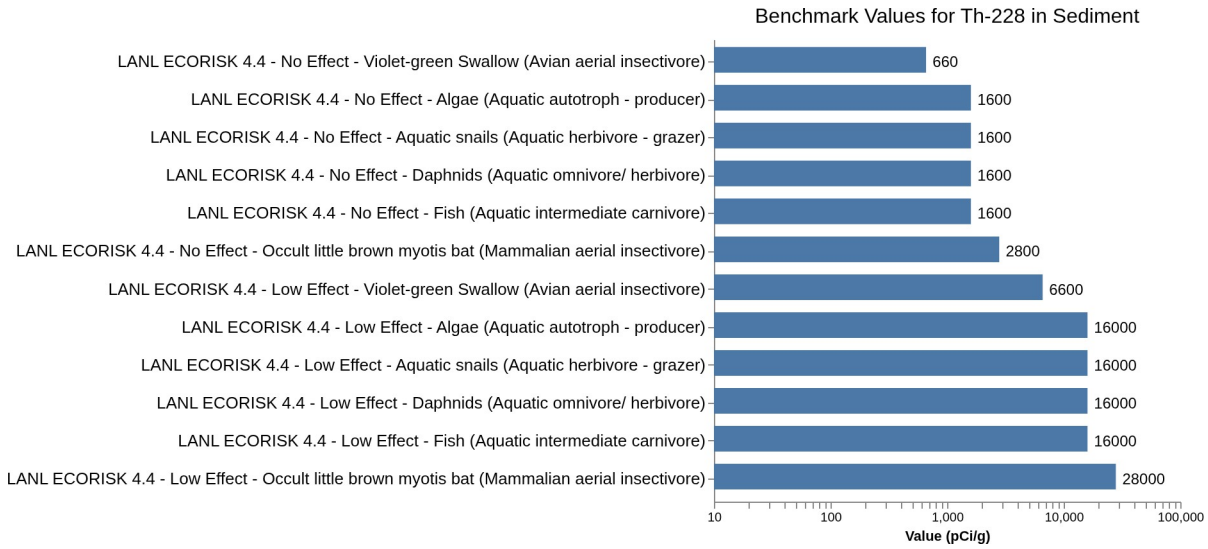


Table 118: Benchmark Values for Th−229 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	560	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2300	
LANL ECORISK	Rad Sediment No Effect	Fish	3200	
LANL ECORISK	Rad Sediment No Effect	Daphnids	3200	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	3200	
LANL ECORISK	Rad Sediment No Effect	Algae	3200	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	5600	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	23000	
LANL ECORISK	Rad Sediment Low Effect	Fish	32000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	32000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	32000	
LANL ECORISK	Rad Sediment Low Effect	Algae	32000	

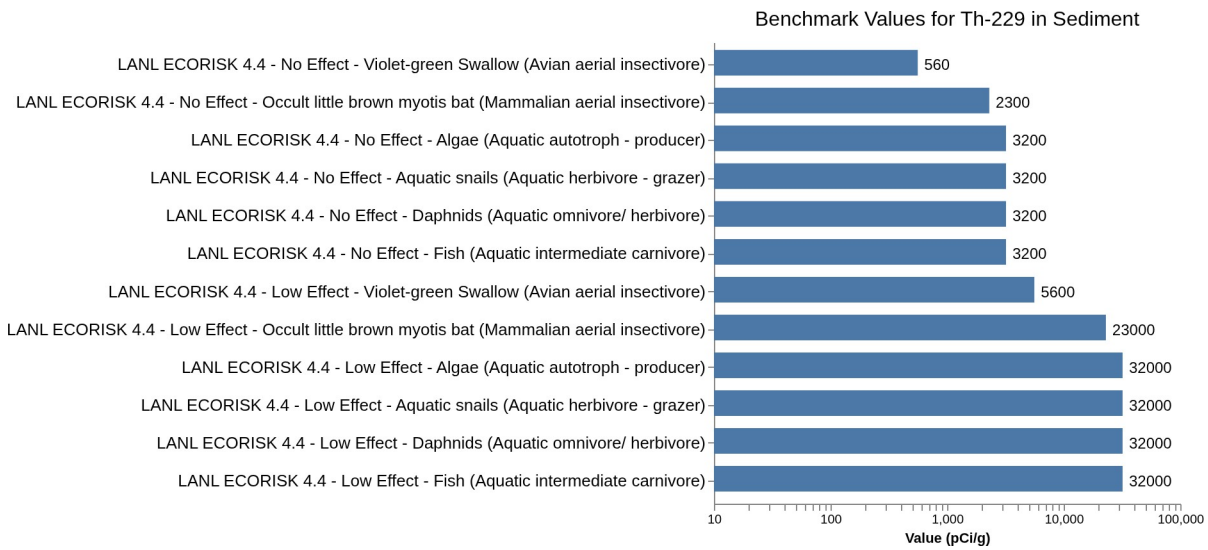


Table 119: Benchmark Values for Th−230 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	600	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2500	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6000	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	25000	
LANL ECORISK	Rad Sediment No Effect	Algae	270000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	270000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	270000	
LANL ECORISK	Rad Sediment No Effect	Fish	270000	
LANL ECORISK	Rad Sediment Low Effect	Algae	2.70e+06	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	2.70e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	2.70e+06	
LANL ECORISK	Rad Sediment Low Effect	Fish	2.70e+06	

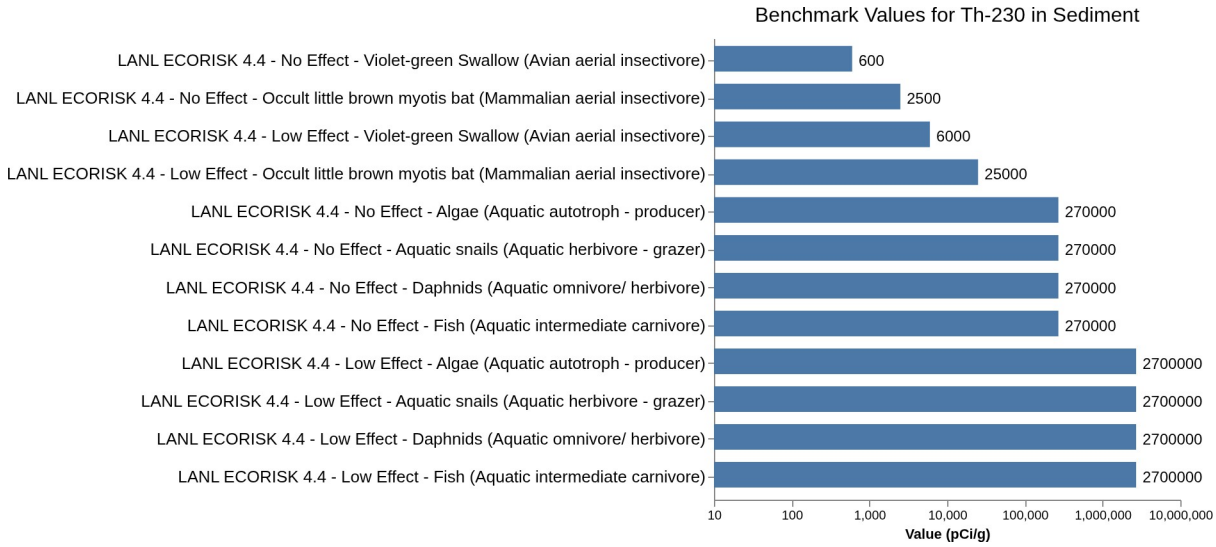


Table 120: Benchmark Values for Th−232 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	1000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	71	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	300	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	710	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	3000	
LANL ECORISK	Rad Sediment No Effect	Algae	320000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	320000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	320000	
LANL ECORISK	Rad Sediment No Effect	Fish	320000	
LANL ECORISK	Rad Sediment Low Effect	Algae	3.20e+06	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	3.20e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	3.20e+06	
LANL ECORISK	Rad Sediment Low Effect	Fish	3.20e+06	

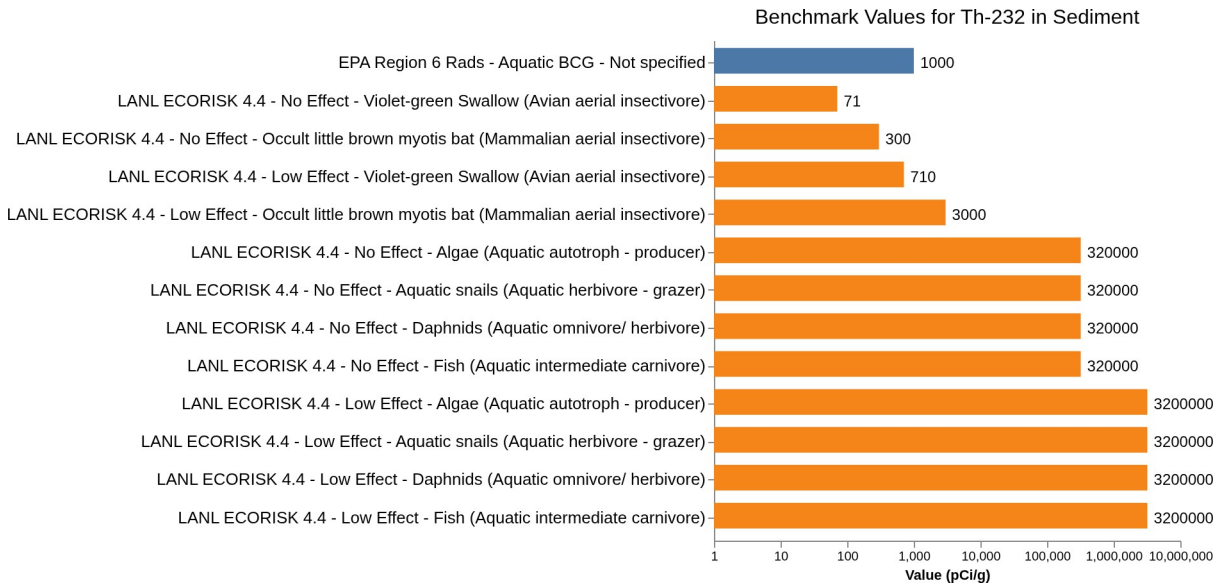


Table 121: Benchmark Values for U−233 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	5000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	630	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2800	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6300	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	28000	
LANL ECORISK	Rad Sediment No Effect	Algae	1000000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	1000000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	1000000	
LANL ECORISK	Rad Sediment No Effect	Fish	1000000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	1.00e+07	
LANL ECORISK	Rad Sediment Low Effect	Algae	1.00e+07	
LANL ECORISK	Rad Sediment Low Effect	Fish	1.00e+07	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	1.00e+07	

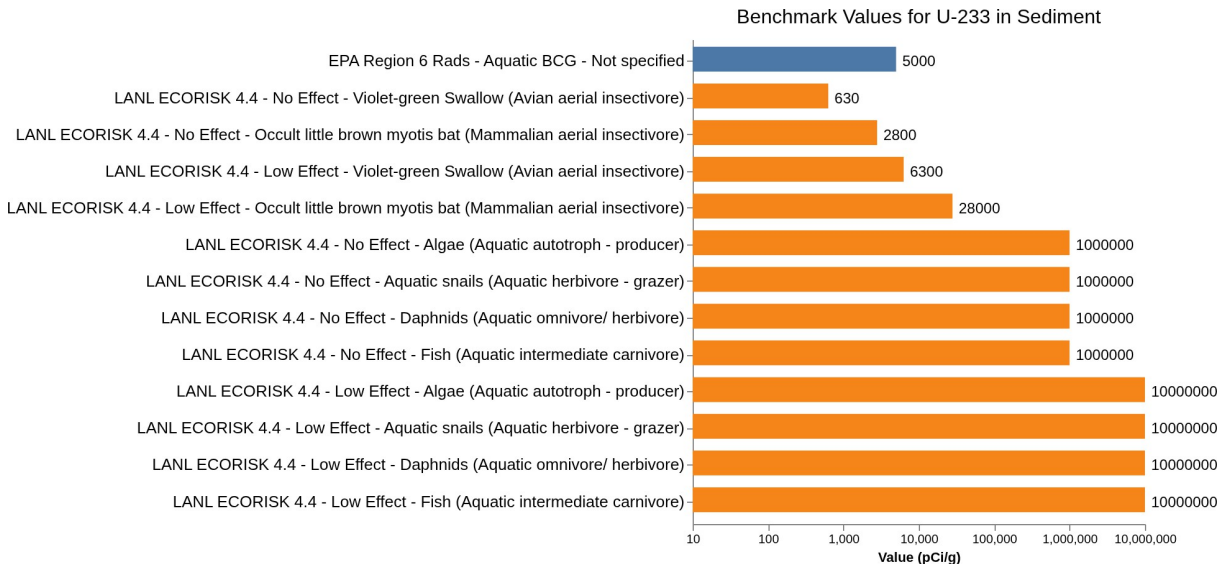


Table 122: Benchmark Values for U−234 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	5000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	630	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	2800	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6300	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	28000	
LANL ECORISK	Rad Sediment No Effect	Algae	300000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	300000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	300000	
LANL ECORISK	Rad Sediment No Effect	Fish	300000	
LANL ECORISK	Rad Sediment Low Effect	Algae	3.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	3.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	3.00e+06	
LANL ECORISK	Rad Sediment Low Effect	Fish	3.00e+06	

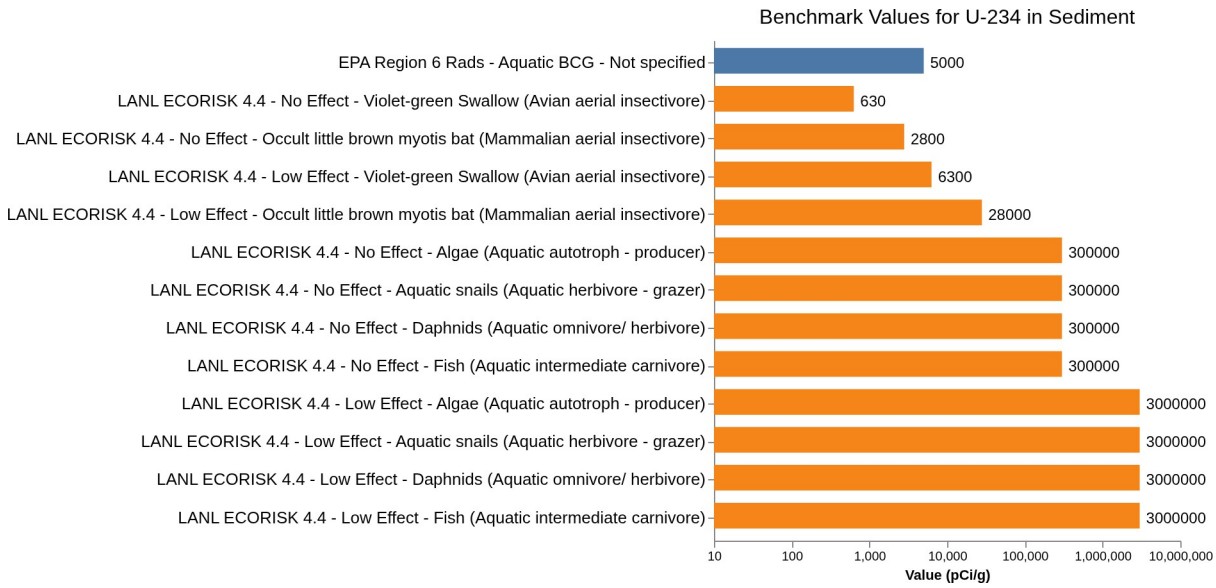


Table 123: Benchmark Values for U−235 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	4000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	680	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	3000	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6800	3
LANL ECORISK	Rad Sediment No Effect	Fish	10000	
LANL ECORISK	Rad Sediment No Effect	Daphnids	10000	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	10000	
LANL ECORISK	Rad Sediment No Effect	Algae	10000	
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	30000	
LANL ECORISK	Rad Sediment Low Effect	Fish	100000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	100000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	100000	
LANL ECORISK	Rad Sediment Low Effect	Algae	100000	

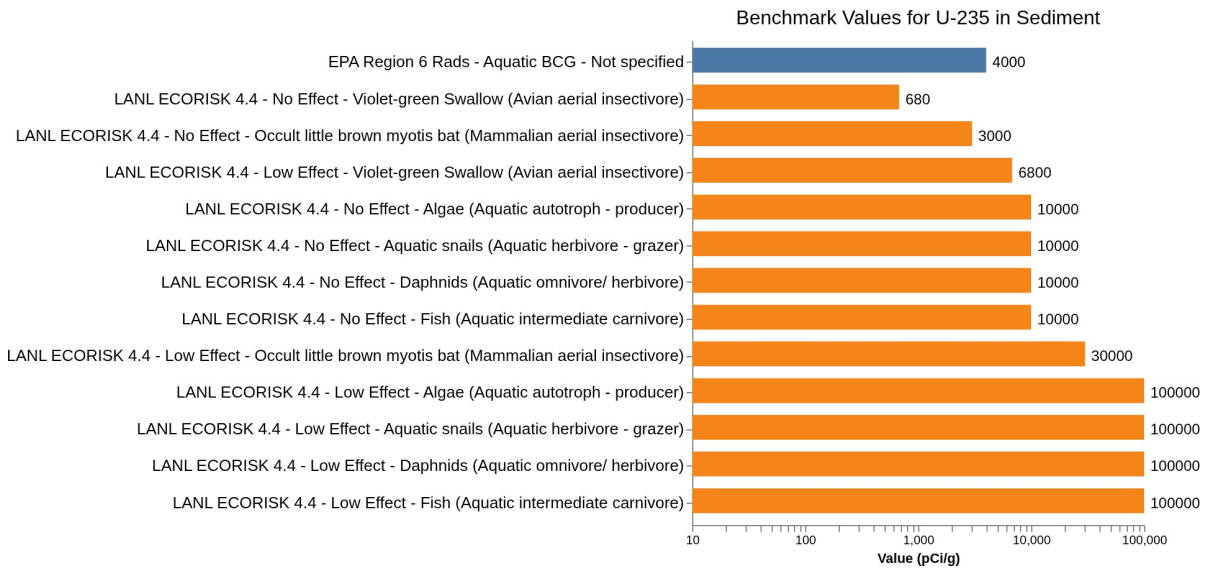


Table 124: Benchmark Values for U−236 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	6.800000e+02	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	3.000000e+03	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	6.800000e+03	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	3.000000e+04	
LANL ECORISK	Rad Sediment No Effect	Algae	4.700000e+22	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	4.700000e+22	
LANL ECORISK	Rad Sediment No Effect	Daphnids	4.700000e+22	
LANL ECORISK	Rad Sediment No Effect	Fish	4.700000e+22	
LANL ECORISK	Rad Sediment Low Effect	Algae	4.700000e+23	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	4.700000e+23	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	4.700000e+23	
LANL ECORISK	Rad Sediment Low Effect	Fish	4.700000e+23	

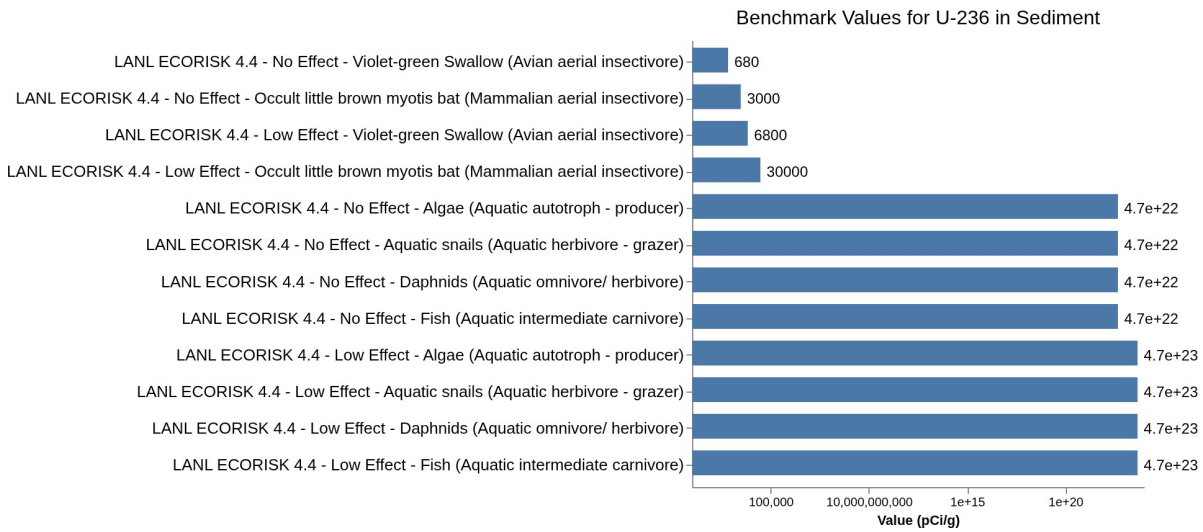


Table 125: Benchmark Values for U−238 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	2000	
LANL ECORISK	Rad Sediment No Effect	Violet−green Swallow	700	3
LANL ECORISK	Rad Sediment No Effect	Occult little brown myotis bat	3100	
LANL ECORISK	Rad Sediment No Effect	Daphnids	4300	
LANL ECORISK	Rad Sediment No Effect	Aquatic snails	4300	
LANL ECORISK	Rad Sediment No Effect	Algae	4300	
LANL ECORISK	Rad Sediment No Effect	Fish	4300	
LANL ECORISK	Rad Sediment Low Effect	Violet−green Swallow	7000	3
LANL ECORISK	Rad Sediment Low Effect	Occult little brown myotis bat	31000	
LANL ECORISK	Rad Sediment Low Effect	Algae	43000	
LANL ECORISK	Rad Sediment Low Effect	Aquatic snails	43000	
LANL ECORISK	Rad Sediment Low Effect	Daphnids	43000	
LANL ECORISK	Rad Sediment Low Effect	Fish	43000	

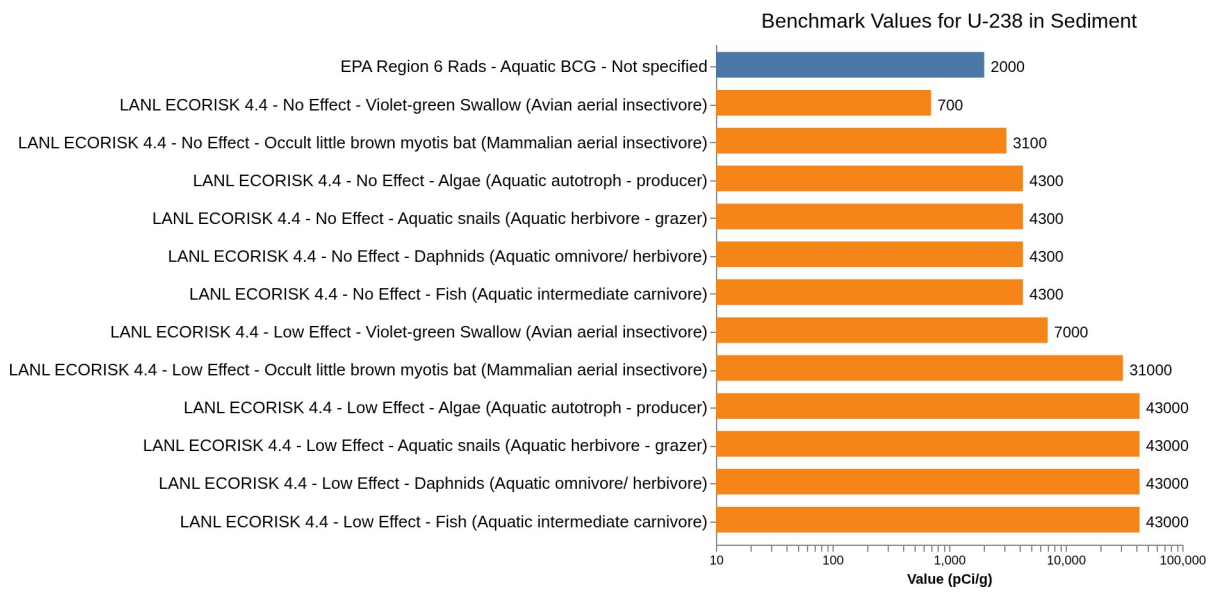


Table 126: Benchmark Values for Zn−65 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	1000	

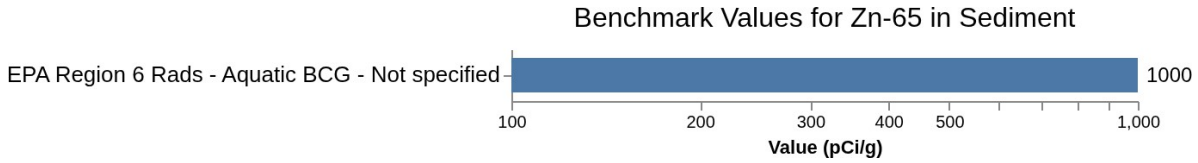
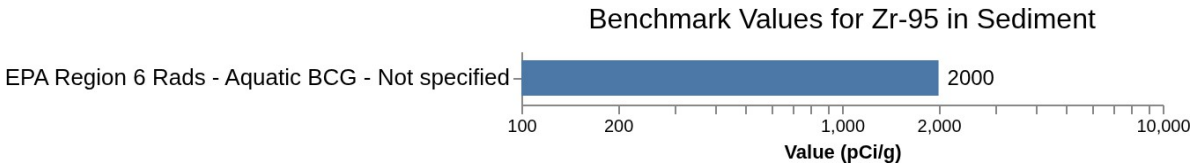


Table 127: Benchmark Values for Zr−95 in Sediment

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Aquatic Sediment BCG	Not specified	2000	



8. RADIONUCLIDE BENCHMARKS FOR SOIL

Table 128: Benchmark Values for Am−241 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	4000.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	190.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	500.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	1900.0	3
LANL ECORISK	Rad Soil No Effect	American robin	4600.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	5000.0	
LANL ECORISK	Rad Soil No Effect	American robin	6100.0	
LANL ECORISK	Rad Soil No Effect	American robin	10000.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	15000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	26000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	33000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	34000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	46000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	47000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	58000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	61000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	100000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	150000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	260000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	330000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	340000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	470000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	580000.0	

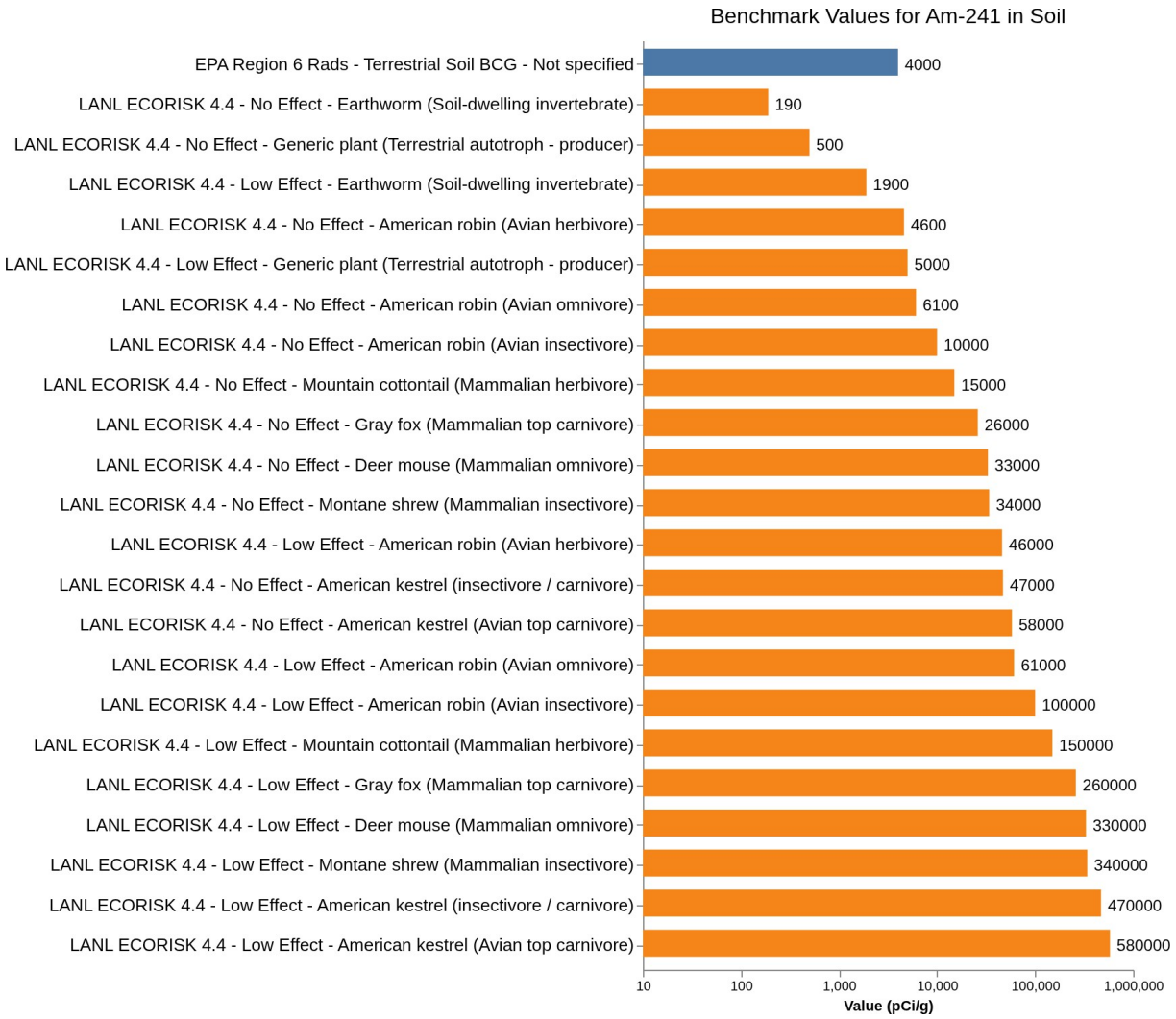

Benchmark Values for Am-241 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
4000
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
190
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
500
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
1900
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
4600
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
5000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
6100
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
10000
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
15000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
26000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
33000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
34000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
46000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
47000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
58000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
61000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
100000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
150000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
260000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
330000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
340000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
470000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
580000
10
100
1,000
10,000
100,000
1,000,000
Value (pCi/g)

Table 129: Benchmark Values for Ce−144 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	1000.0	

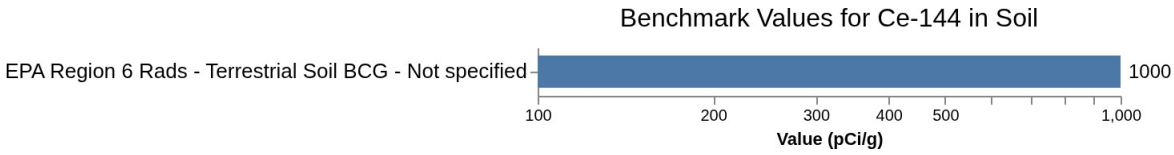


Table 130: Benchmark Values for Co−60 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	700.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	760.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	760.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	760.0	3
LANL ECORISK	Rad Soil No Effect	Gray fox	760.0	3
LANL ECORISK	Rad Soil No Effect	Montane shrew	760.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	760.0	3
LANL ECORISK	Rad Soil No Effect	American kestrel	1500.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1500.0	
LANL ECORISK	Rad Soil No Effect	American robin	1500.0	
LANL ECORISK	Rad Soil No Effect	American robin	1500.0	
LANL ECORISK	Rad Soil No Effect	American robin	1500.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	7600.0	3
LANL ECORISK	Rad Soil Low Effect	Earthworm	7600.0	3
LANL ECORISK	Rad Soil Low Effect	Generic plant	7600.0	3
LANL ECORISK	Rad Soil Low Effect	Gray fox	7600.0	3
LANL ECORISK	Rad Soil Low Effect	Montane shrew	7600.0	3
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	7600.0	3
LANL ECORISK	Rad Soil Low Effect	American robin	15000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	15000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	15000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	15000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	15000.0	

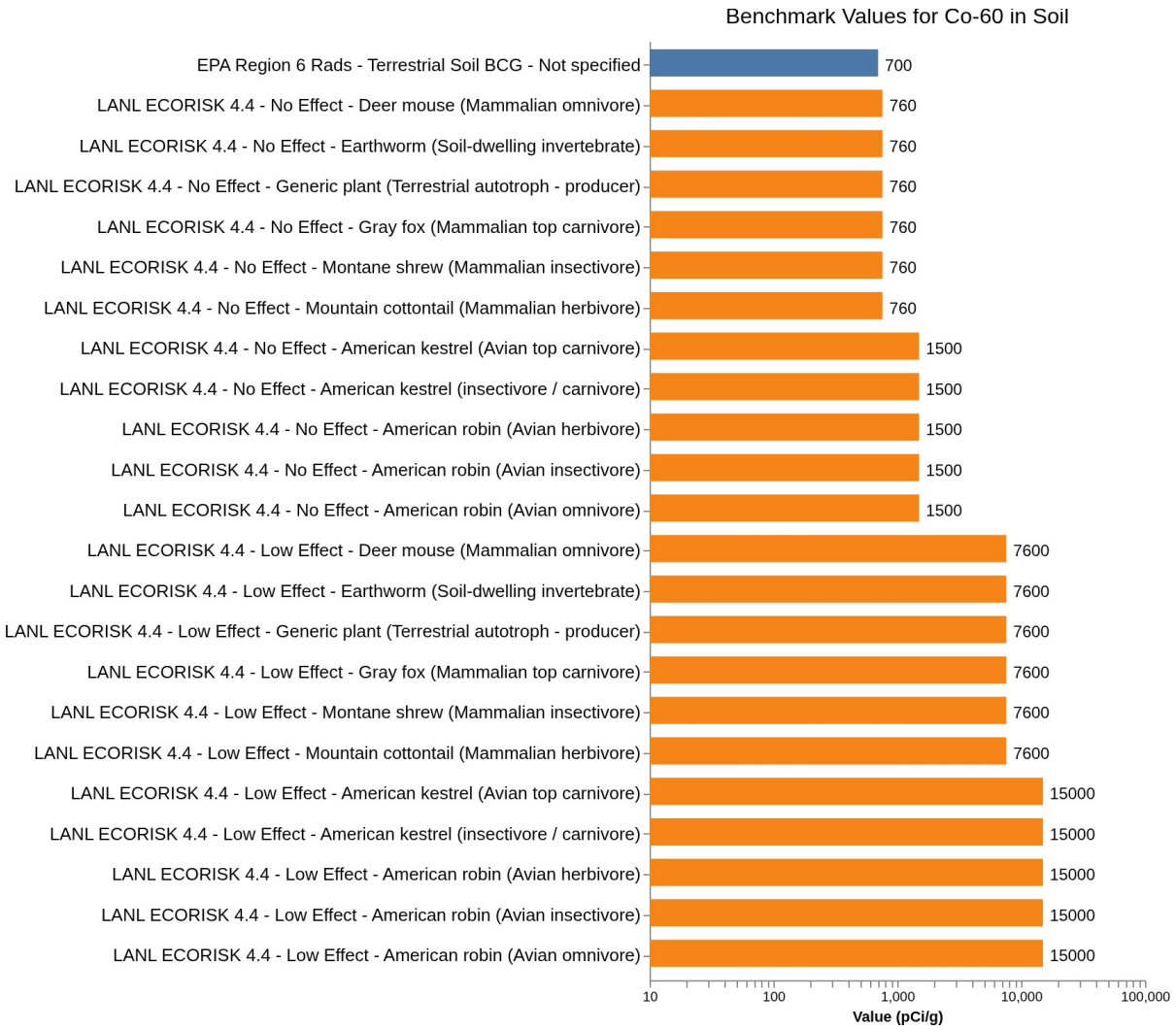

Benchmark Values for Co-60 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
700
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
760
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
760
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
760
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
760
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
760
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
760
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
1500
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
1500
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
1500
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
1500
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
1500
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
7600
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
7600
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
7600
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
7600
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
7600
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
7600
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
15000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
15000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
15000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
15000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
15000
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 131: Benchmark Values for Cs−134 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	650.0	3
LANL ECORISK	Rad Soil No Effect	American robin	680.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	700.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	730.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1000.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	1000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	1100.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	1100.0	
LANL ECORISK	Rad Soil No Effect	American robin	1200.0	
LANL ECORISK	Rad Soil No Effect	American robin	2100.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	6500.0	3
LANL ECORISK	Rad Soil Low Effect	American robin	6800.0	3
LANL ECORISK	Rad Soil Low Effect	Generic plant	7000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	7300.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	10000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	11000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	11000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	12000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	21000.0	

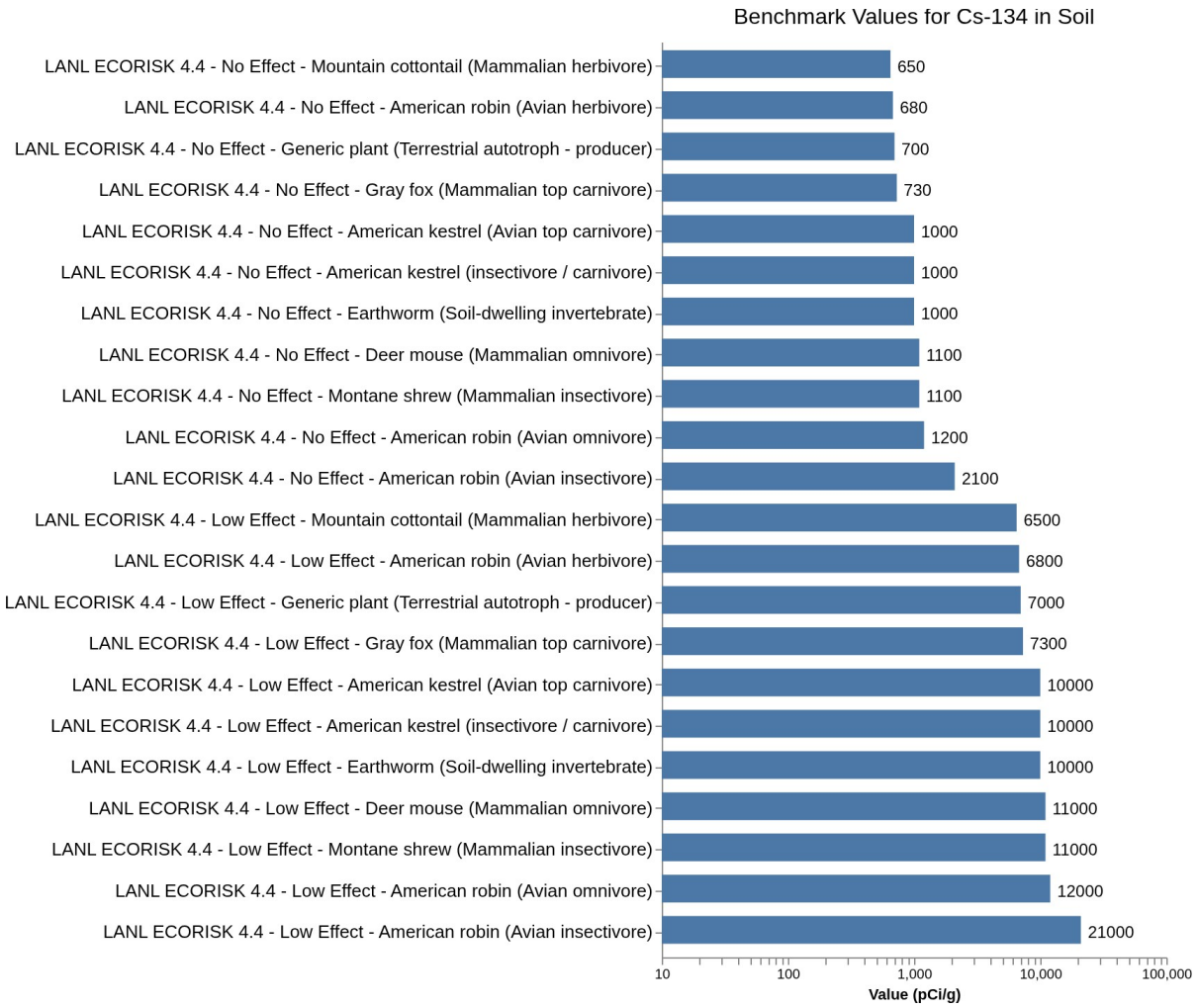

Benchmark Values for Cs-134 in Soil
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
650
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
680
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
700
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
730
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
1000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
1000
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
1000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
1100
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
1100
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
1200
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
2100
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
6500
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
6800
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
7000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
7300
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
10000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
10000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
10000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
11000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
11000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
12000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
21000
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 132: Benchmark Values for Cs−135 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	300.0	

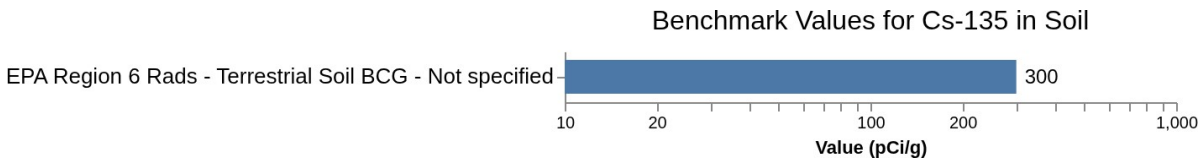


Table 133: Benchmark Values for Cs−137 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	20.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1400.0	1
LANL ECORISK	Rad Soil No Effect	American robin	1400.0	1, 3
LANL ECORISK	Rad Soil No Effect	Generic plant	1500.0	1
LANL ECORISK	Rad Soil No Effect	Gray fox	1500.0	1
LANL ECORISK	Rad Soil No Effect	Deer mouse	2300.0	1
LANL ECORISK	Rad Soil No Effect	Earthworm	2300.0	1
LANL ECORISK	Rad Soil No Effect	Montane shrew	2400.0	1
LANL ECORISK	Rad Soil No Effect	American robin	2600.0	1
LANL ECORISK	Rad Soil No Effect	American kestrel	3900.0	1
LANL ECORISK	Rad Soil No Effect	American kestrel	4300.0	1
LANL ECORISK	Rad Soil No Effect	American robin	4500.0	1
LANL ECORISK	Rad Soil Low Effect	American robin	14000.0	1, 3
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	14000.0	1
LANL ECORISK	Rad Soil Low Effect	Generic plant	15000.0	1
LANL ECORISK	Rad Soil Low Effect	Gray fox	15000.0	1
LANL ECORISK	Rad Soil Low Effect	Deer mouse	23000.0	1
LANL ECORISK	Rad Soil Low Effect	Earthworm	23000.0	1
LANL ECORISK	Rad Soil Low Effect	Montane shrew	24000.0	1
LANL ECORISK	Rad Soil Low Effect	American robin	26000.0	1
LANL ECORISK	Rad Soil Low Effect	American kestrel	39000.0	1
LANL ECORISK	Rad Soil Low Effect	American kestrel	43000.0	1
LANL ECORISK	Rad Soil Low Effect	American robin	45000.0	1

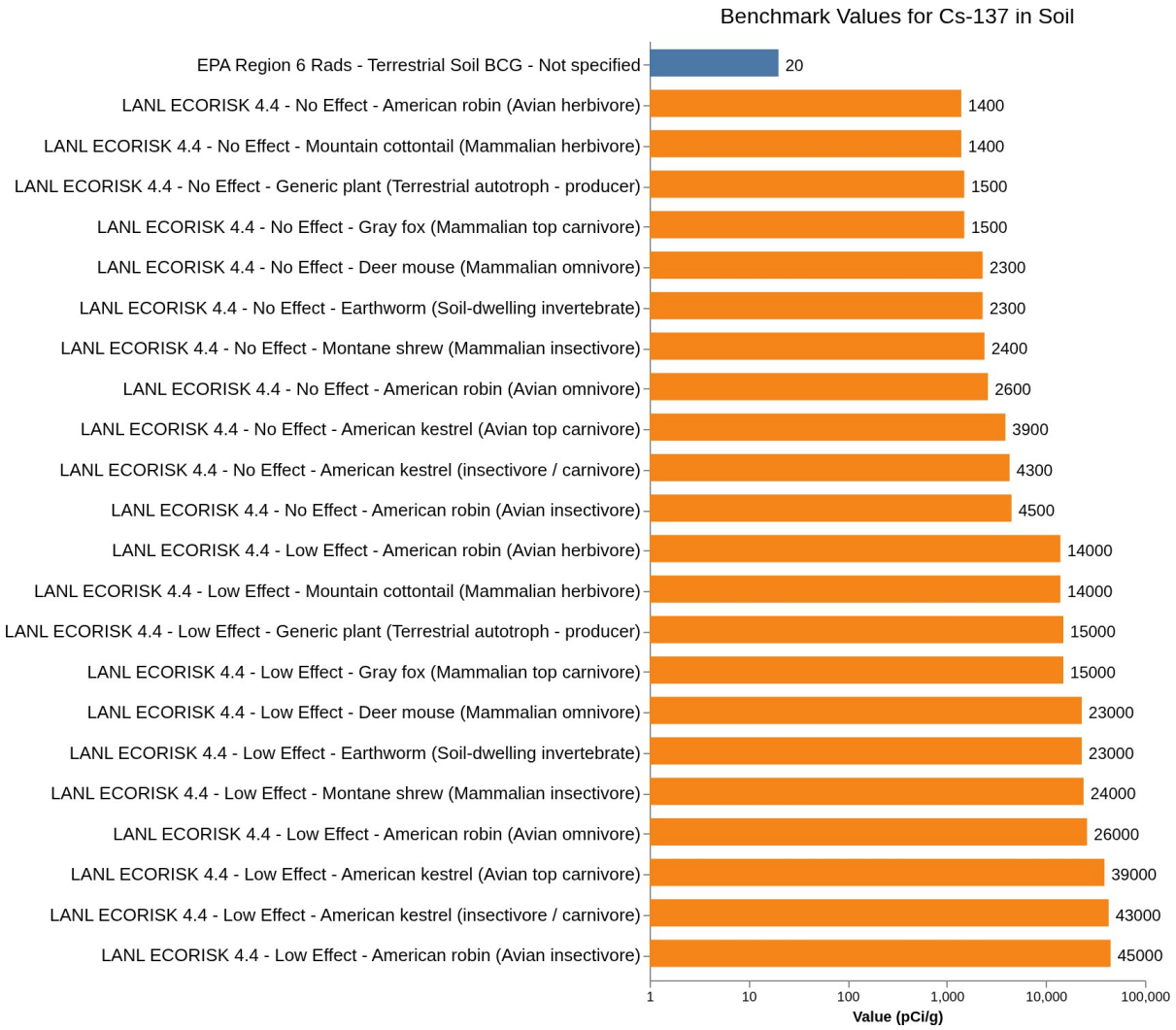

Benchmark Values for Cs-137 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
20
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
1400
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
1400
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
1500
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
1500
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
2300
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
2300
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
2400
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
2600
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
3900
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
4300
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
4500
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
14000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
14000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
15000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
15000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
23000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
23000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
24000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
26000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
39000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
43000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
45000
1
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 134: Benchmark Values for Eu−152 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	520.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	520.0	3
LANL ECORISK	Rad Soil No Effect	Gray fox	520.0	3
LANL ECORISK	Rad Soil No Effect	Deer mouse	530.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	530.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	530.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1000.0	
LANL ECORISK	Rad Soil No Effect	American robin	1000.0	
LANL ECORISK	Rad Soil No Effect	American robin	1000.0	
LANL ECORISK	Rad Soil No Effect	American robin	1000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	5200.0	3
LANL ECORISK	Rad Soil Low Effect	Gray fox	5200.0	3
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	5200.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	5300.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	5300.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	5300.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	10000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	10000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	10000.0	

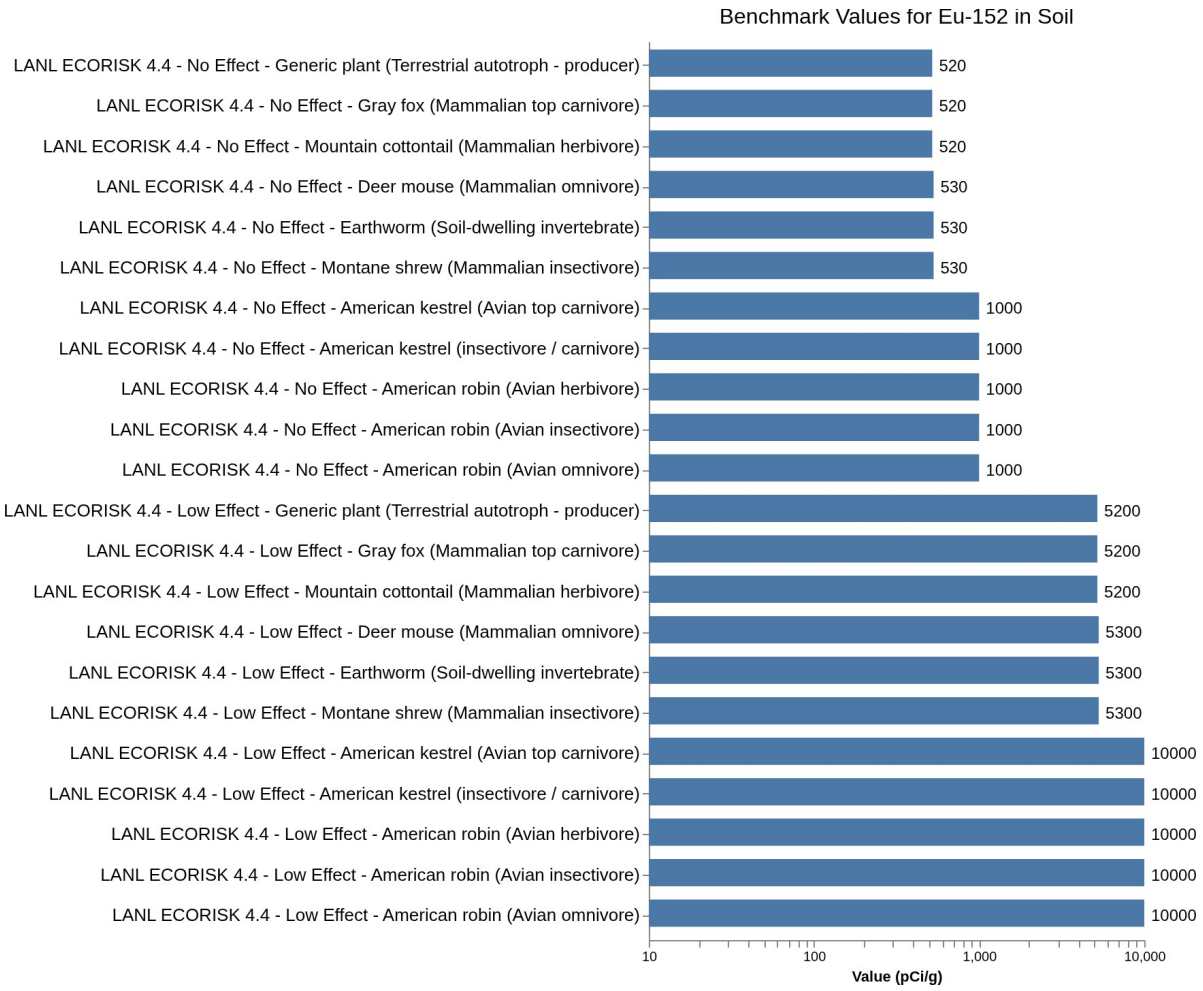

Benchmark Values for Eu-152 in Soil
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
520
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
520
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
520
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
530
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
530
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
530
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
1000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
1000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
1000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
1000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
1000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
5200
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
5200
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
5200
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
5300
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
5300
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
5300
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
10000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
10000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
10000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
10000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
10000
10
100
1,000
10,000
Value (pCi/g)

Table 135: Benchmark Values for Eu−154 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	1000.0	

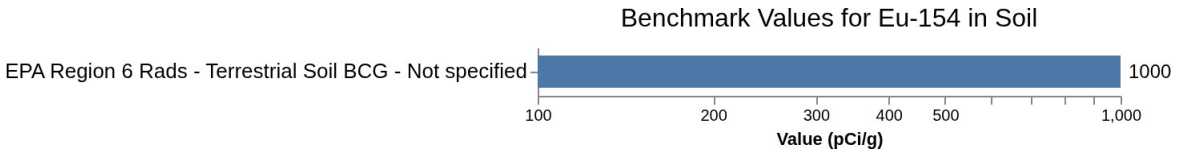


Table 136: Benchmark Values for Eu−155 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	20000.0	

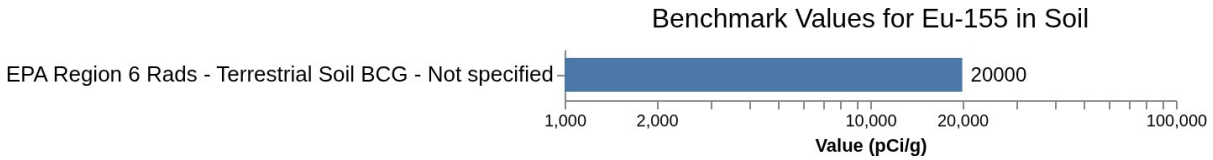


Table 137: Benchmark Values for H−3 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	200000.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	36000.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	48000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	220000.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	250000.0	
LANL ECORISK	Rad Soil No Effect	American robin	300000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	330000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	340000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	360000.0	3
LANL ECORISK	Rad Soil No Effect	American robin	440000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	480000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	550000.0	
LANL ECORISK	Rad Soil No Effect	American robin	600000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	610000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	2200000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	2500000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	3000000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	3300000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	3400000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	4400000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	5500000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	6000000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	6100000.0	

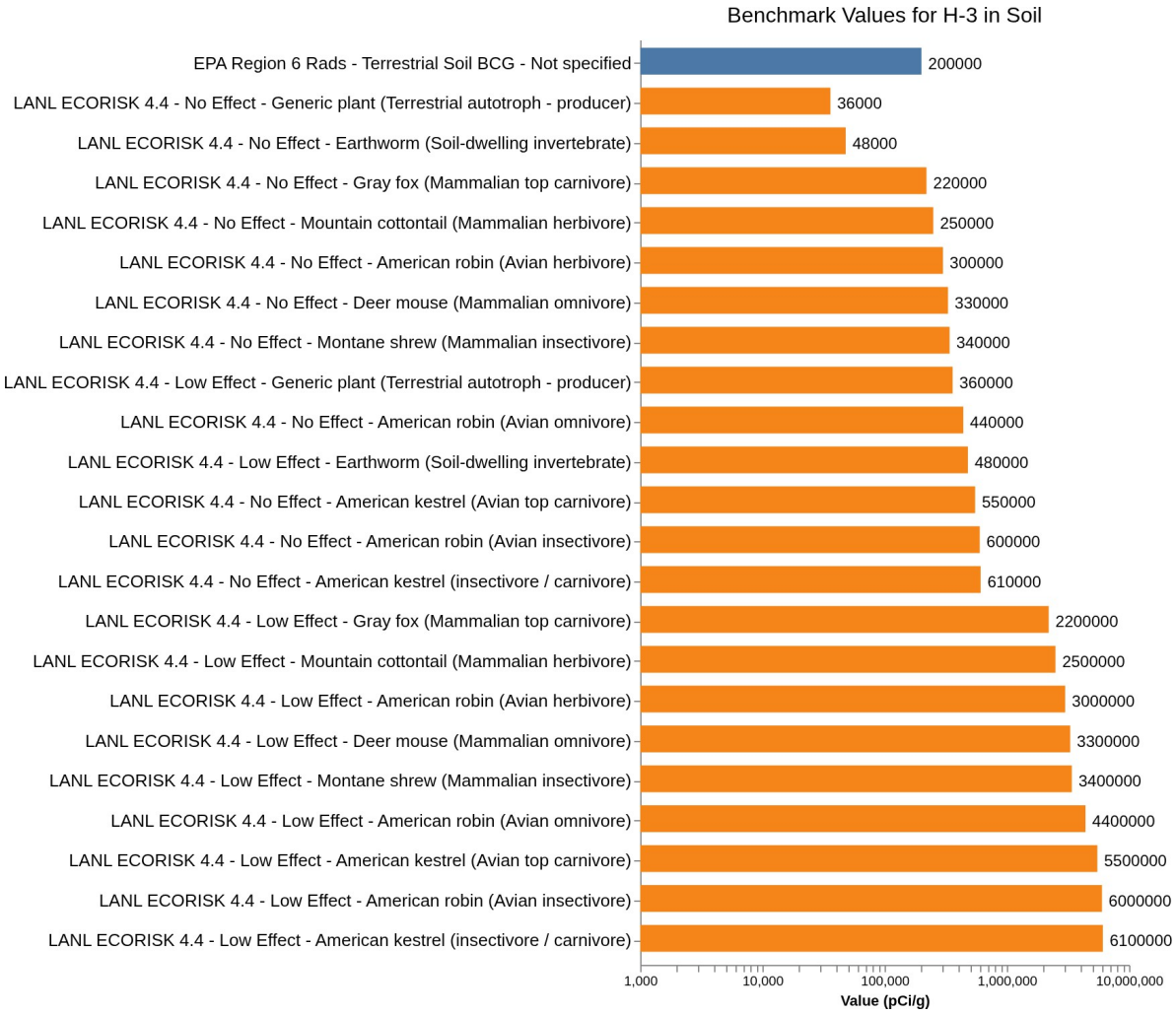


Table 138: Benchmark Values for I−129 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	6000.0	

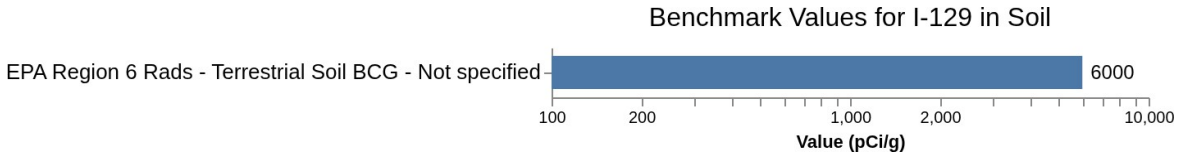


Table 139: Benchmark Values for I−131 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	900.0	

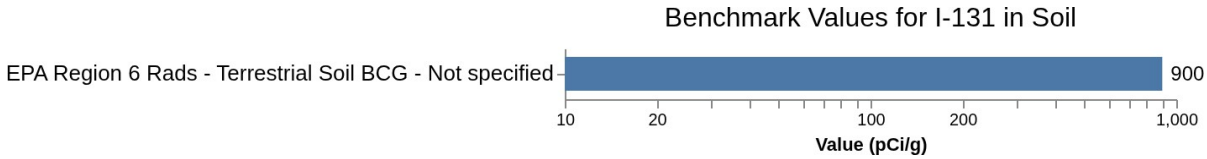


Table 140: Benchmark Values for Na−22 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Gray fox	4000.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	6500.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	8700.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	8900.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	9000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	9000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	11000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	14000.0	
LANL ECORISK	Rad Soil No Effect	American robin	16000.0	
LANL ECORISK	Rad Soil No Effect	American robin	16000.0	
LANL ECORISK	Rad Soil No Effect	American robin	17000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	40000.0	3
LANL ECORISK	Rad Soil Low Effect	Earthworm	65000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	87000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	89000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	90000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	90000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	110000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	140000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	160000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	160000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	170000.0	

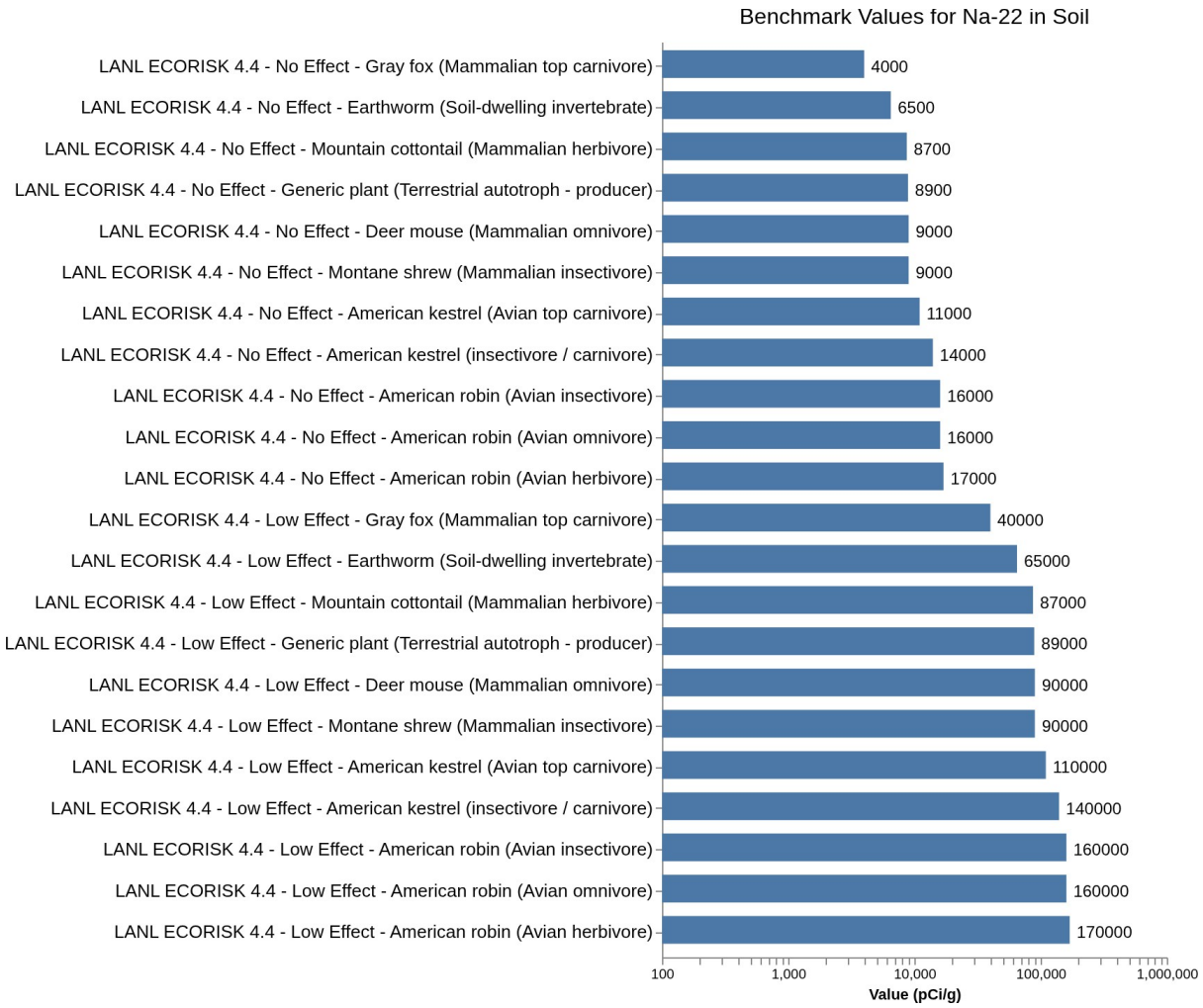

Benchmark Values for Na-22 in Soil
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
4000
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
6500
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
8700
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
8900
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
9000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
9000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
11000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
14000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
16000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
16000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
17000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
40000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
65000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
87000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
89000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
90000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
90000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
110000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
140000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
160000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
160000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
170000
100
1,000
10,000
100,000
1,000,000
Value (pCi/g)

Table 141: Benchmark Values for Np−237 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	50.0	3
LANL ECORISK	Rad Soil No Effect	American robin	200.0	
LANL ECORISK	Rad Soil No Effect	American robin	210.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	500.0	3
LANL ECORISK	Rad Soil No Effect	Gray fox	590.0	
LANL ECORISK	Rad Soil No Effect	American robin	590.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1300.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1300.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1700.0	
LANL ECORISK	Rad Soil Low Effect	American robin	2000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	2100.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	2700.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	3300.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	3600.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	5900.0	
LANL ECORISK	Rad Soil Low Effect	American robin	5900.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	13000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	13000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	17000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	27000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	33000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	36000.0	

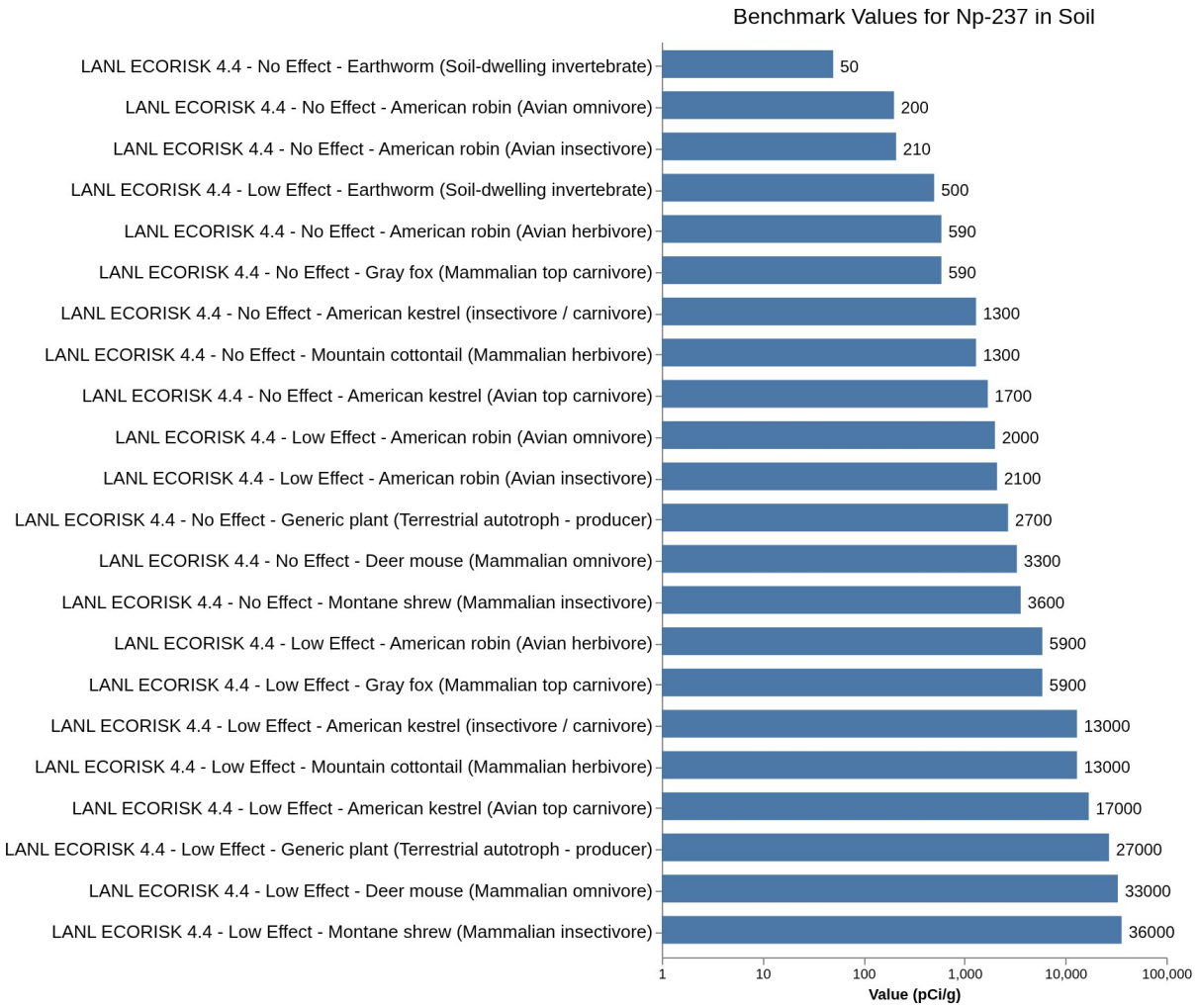

Benchmark Values for Np-237 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
50
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
200
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
210
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
500
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
590
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
590
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
1300
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
1300
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
1700
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
2000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
2100
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
2700
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
3300
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
3600
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
5900
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
5900
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
13000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
13000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
17000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
27000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
33000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
36000
1
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 142: Benchmark Values for Pb−210 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	1200.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	3400.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	4200.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	4400.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	4500.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	4500.0	
LANL ECORISK	Rad Soil No Effect	American robin	5600.0	
LANL ECORISK	Rad Soil No Effect	American robin	6000.0	
LANL ECORISK	Rad Soil No Effect	American robin	6200.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	8700.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	8900.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	12000.0	3
LANL ECORISK	Rad Soil Low Effect	Generic plant	34000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	42000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	44000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	45000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	45000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	56000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	60000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	61000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	87000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	88000.0	

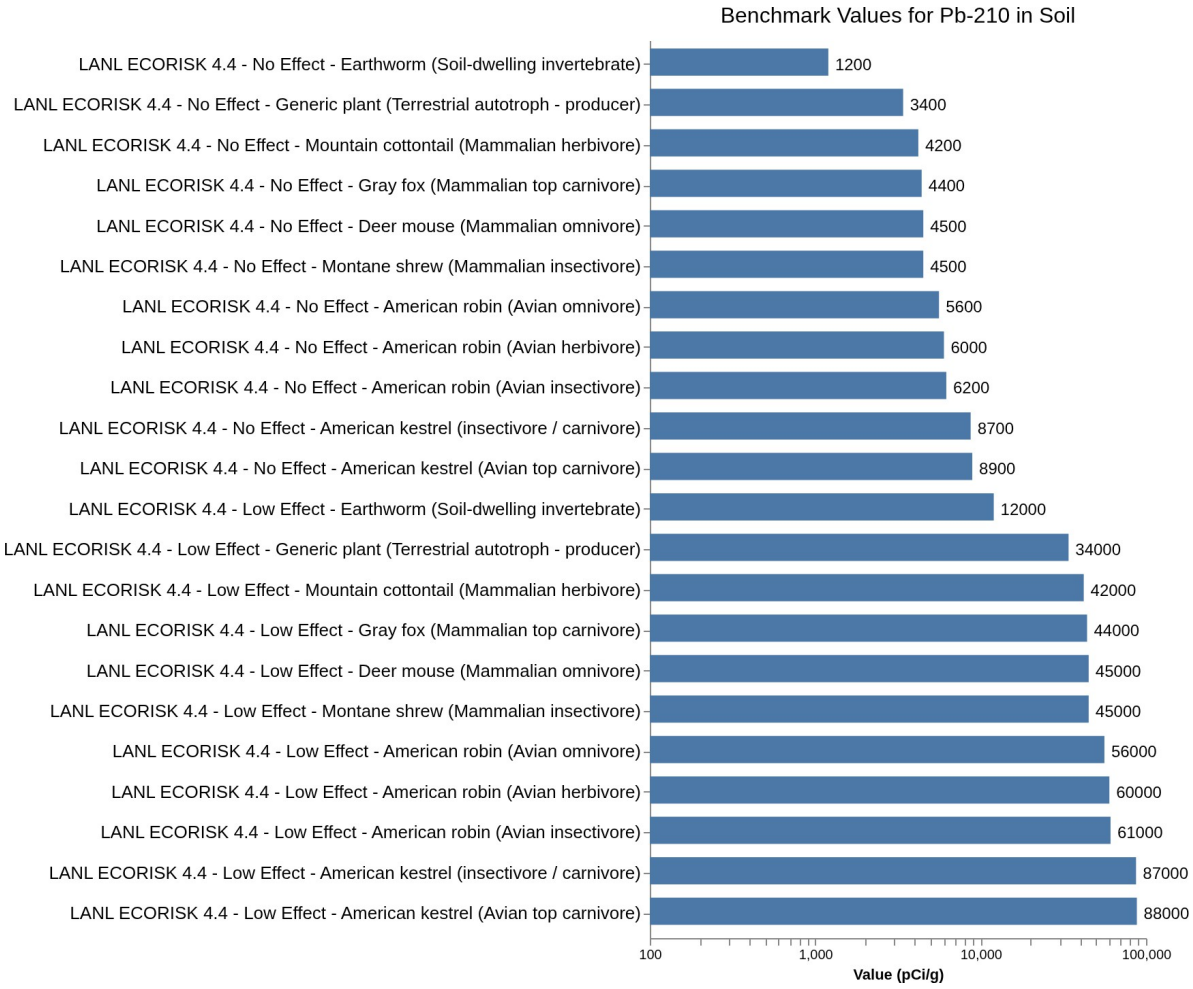

Benchmark Values for Pb-210 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
1200
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
3400
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
4200
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
4400
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
4500
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
4500
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
5600
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
6000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
6200
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
8700
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
8900
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
12000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
34000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
42000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
44000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
45000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
45000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
56000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
60000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
61000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
87000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
88000
100
1,000
10,000
100,000
Value (pCi/g)

Table 143: Benchmark Values for Pu−238 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	820.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	1800.0	
LANL ECORISK	Rad Soil No Effect	American robin	4300.0	
LANL ECORISK	Rad Soil No Effect	American robin	5900.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	8200.0	3
LANL ECORISK	Rad Soil No Effect	American robin	10000.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	16000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	18000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	43000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	45000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	59000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	100000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	120000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	130000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	160000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	170000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	190000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	450000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	1200000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	1300000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	1700000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	1900000.0	

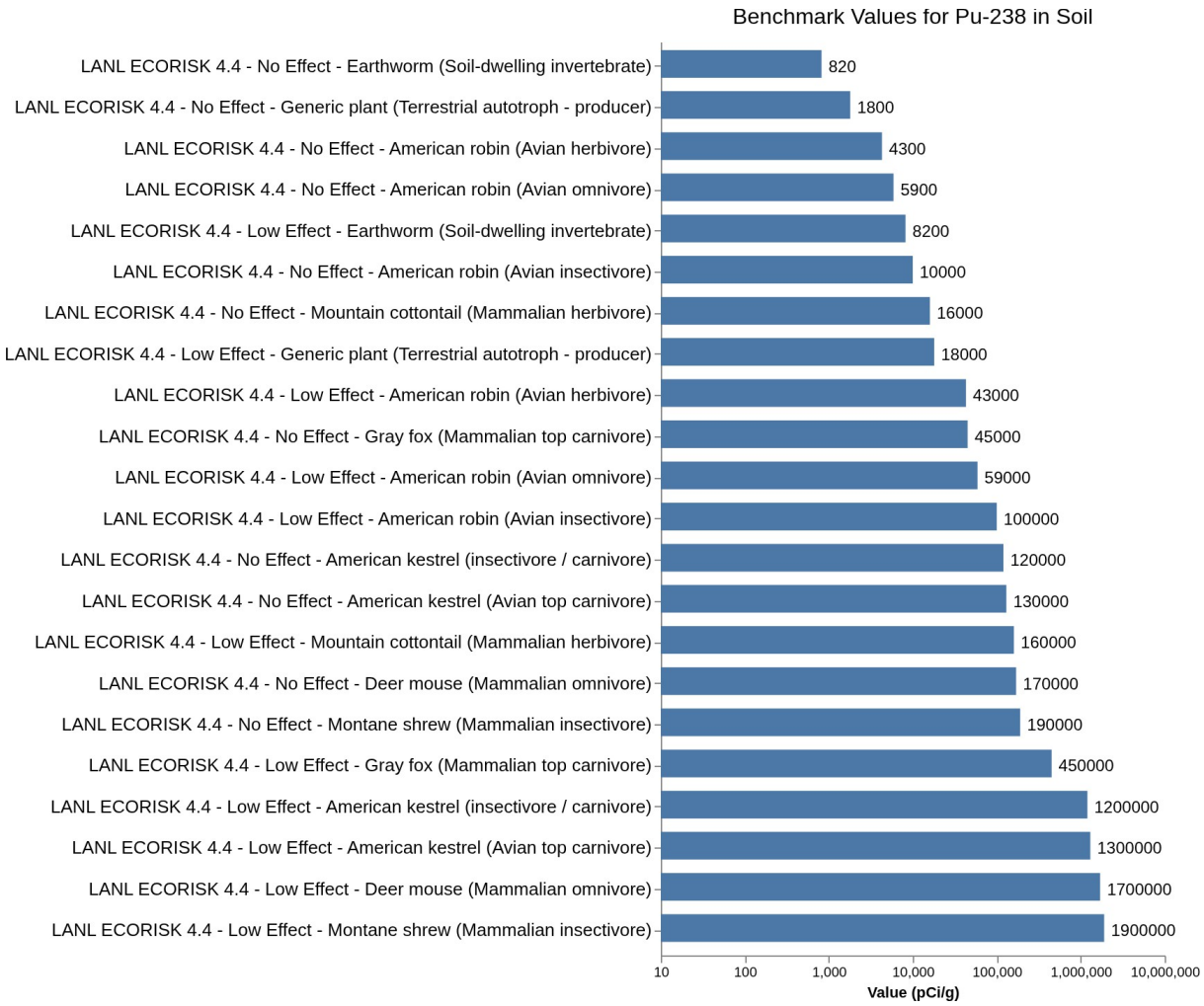

Benchmark Values for Pu-238 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
820
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
1800
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
4300
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
5900
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
8200
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
10000
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
16000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
18000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
43000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
45000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
59000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
100000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
120000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
130000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
160000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
170000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
190000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
450000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
1200000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
1300000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
1700000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
1900000
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 144: Benchmark Values for Pu−239 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	6000.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	870.0	3, 4
LANL ECORISK	Rad Soil No Effect	Generic plant	1900.0	4
LANL ECORISK	Rad Soil No Effect	American robin	4400.0	4
LANL ECORISK	Rad Soil No Effect	American robin	6100.0	4
LANL ECORISK	Rad Soil Low Effect	Earthworm	8700.0	3, 4
LANL ECORISK	Rad Soil No Effect	American robin	10000.0	4
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	17000.0	4
LANL ECORISK	Rad Soil Low Effect	Generic plant	19000.0	4
LANL ECORISK	Rad Soil Low Effect	American robin	44000.0	4
LANL ECORISK	Rad Soil No Effect	Gray fox	51000.0	4
LANL ECORISK	Rad Soil Low Effect	American robin	61000.0	4
LANL ECORISK	Rad Soil Low Effect	American robin	100000.0	4
LANL ECORISK	Rad Soil No Effect	American kestrel	140000.0	4
LANL ECORISK	Rad Soil No Effect	American kestrel	150000.0	4
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	170000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	280000.0	4
LANL ECORISK	Rad Soil No Effect	Montane shrew	330000.0	4
LANL ECORISK	Rad Soil Low Effect	Gray fox	510000.0	4
LANL ECORISK	Rad Soil Low Effect	American kestrel	1400000.0	4
LANL ECORISK	Rad Soil Low Effect	American kestrel	1500000.0	4
LANL ECORISK	Rad Soil Low Effect	Deer mouse	2800000.0	4
LANL ECORISK	Rad Soil Low Effect	Montane shrew	3300000.0	4

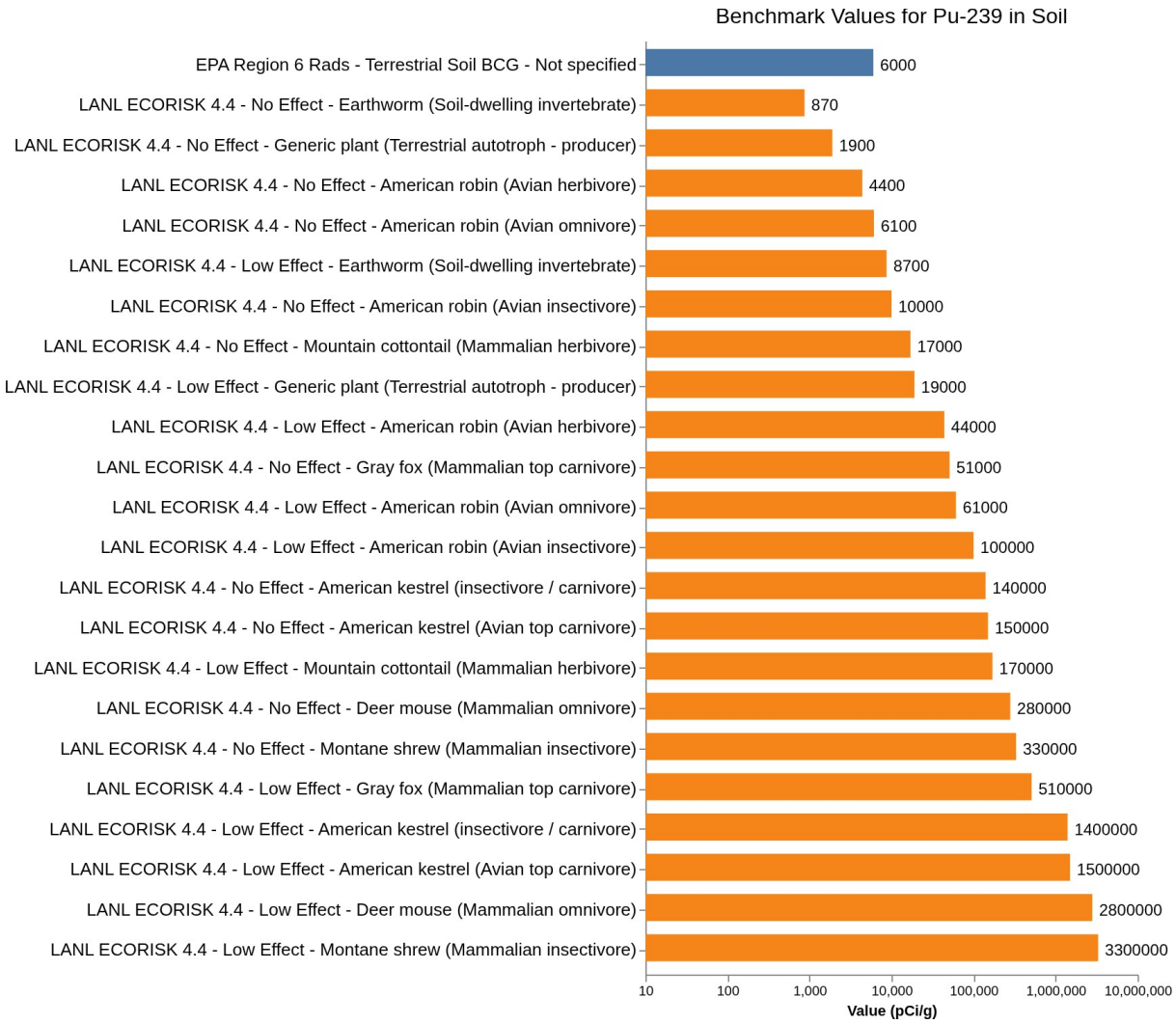

Benchmark Values for Pu-239 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
6000
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
870
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
1900
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
4400
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
6100
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
8700
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
10000
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
17000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
19000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
44000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
51000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
61000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
100000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
140000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
150000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
170000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
280000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
330000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
510000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
1400000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
1500000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
2800000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
3300000
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 145: Benchmark Values for Pu−241 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	17000.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	36000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	170000.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	350000.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	360000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	360000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	370000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	370000.0	
LANL ECORISK	Rad Soil No Effect	American robin	700000.0	
LANL ECORISK	Rad Soil No Effect	American robin	710000.0	
LANL ECORISK	Rad Soil No Effect	American robin	720000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	730000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	730000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	3500000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	3600000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	3700000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	3700000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	7000000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	7100000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	7200000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	7300000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	7300000.0	

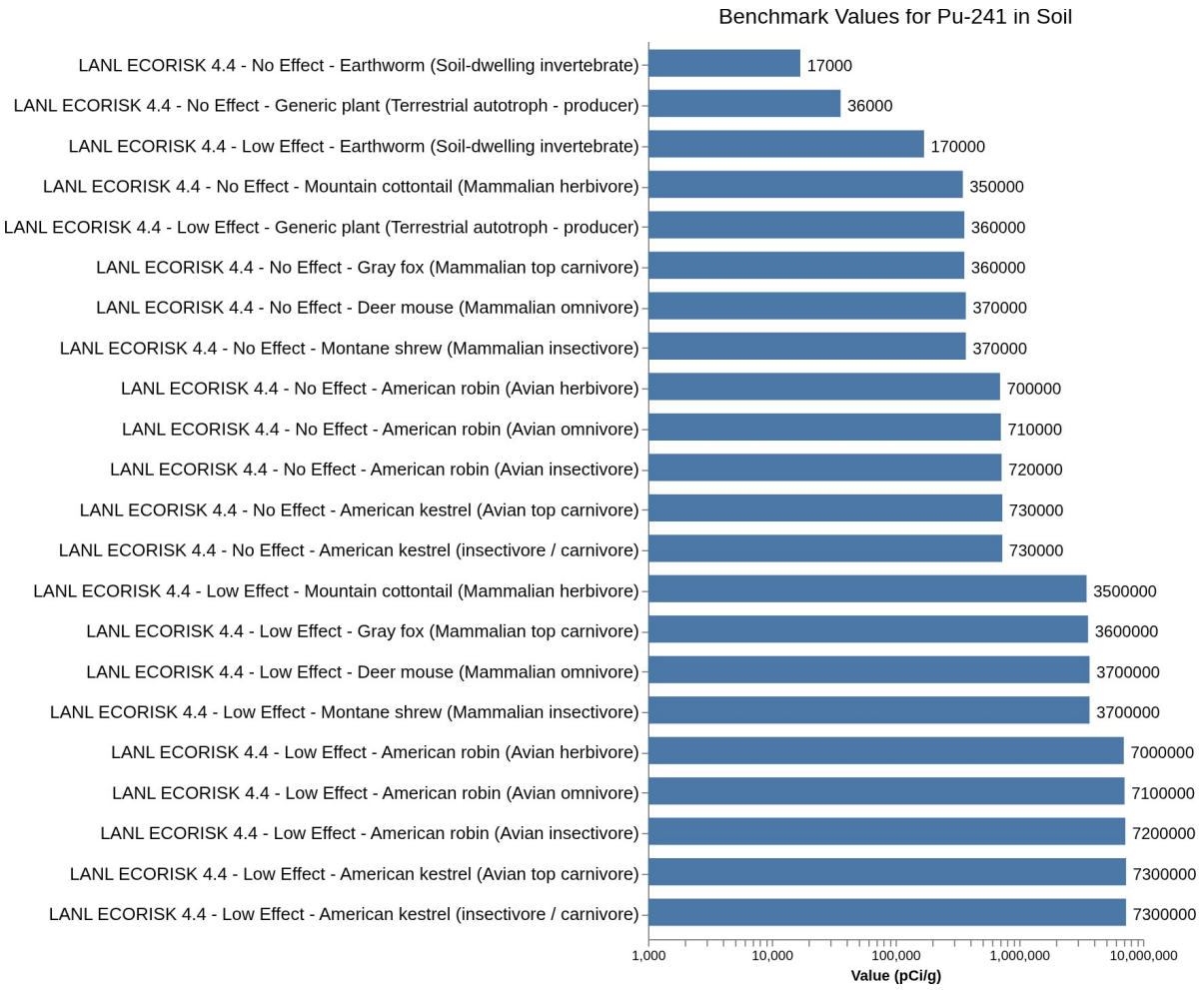

Benchmark Values for Pu-241 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
17000
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
36000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
170000
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
350000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
360000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
360000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
370000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
370000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
700000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
710000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
720000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
730000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
730000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
3500000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
3600000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
3700000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
3700000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
7000000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
7100000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
7200000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
7300000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
7300000
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 146: Benchmark Values for Ra−226 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	50.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	1.5	3
LANL ECORISK	Rad Soil No Effect	American robin	8.2	
LANL ECORISK	Rad Soil No Effect	American robin	8.4	
LANL ECORISK	Rad Soil Low Effect	Earthworm	15.0	3
LANL ECORISK	Rad Soil No Effect	American robin	34.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	54.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	79.0	
LANL ECORISK	Rad Soil Low Effect	American robin	82.0	
LANL ECORISK	Rad Soil Low Effect	American robin	84.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	160.0	
LANL ECORISK	Rad Soil Low Effect	American robin	340.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	370.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	380.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	510.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	540.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	790.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	930.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	1600.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	3700.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	3800.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	5100.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	9300.0	

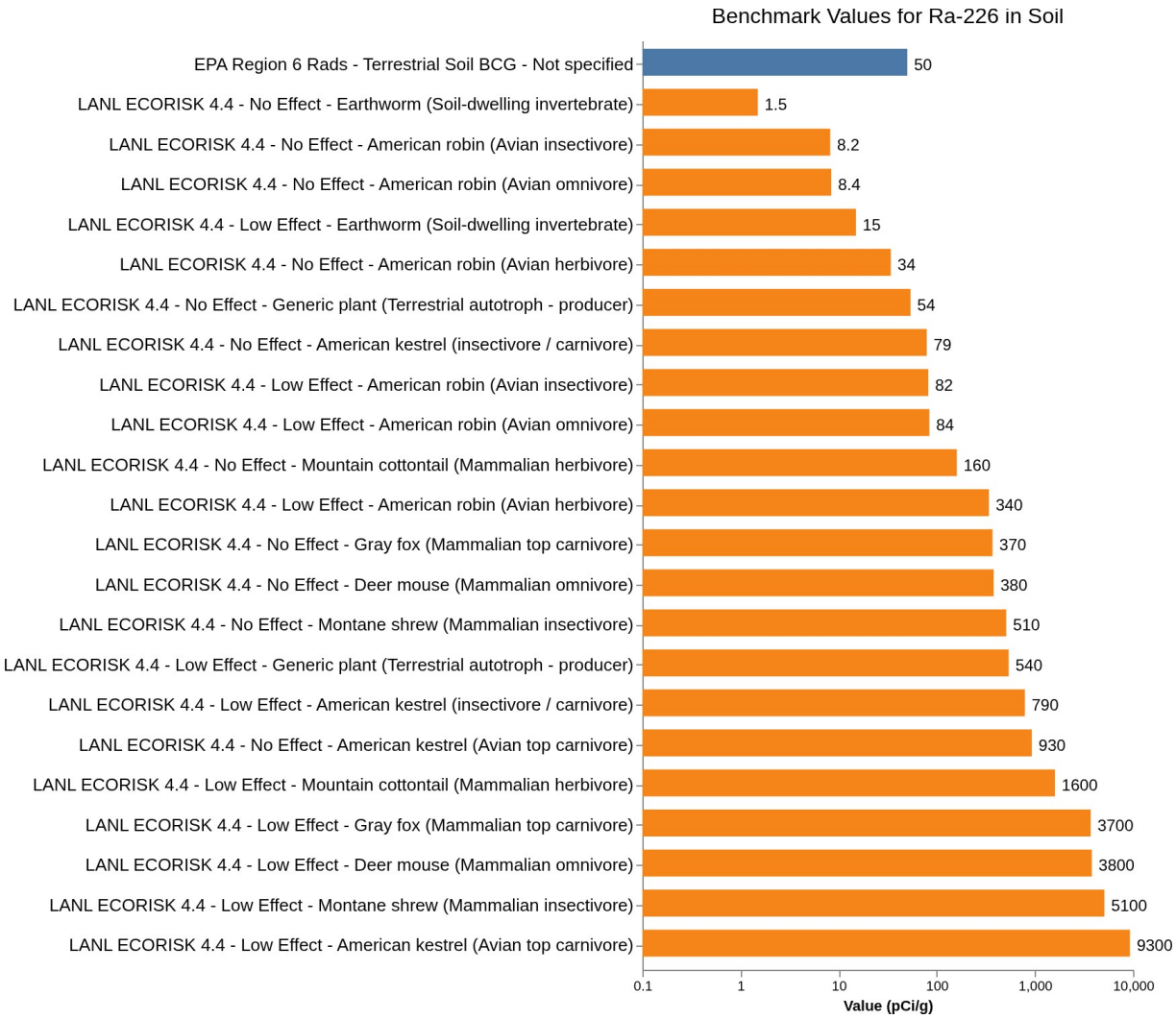

Benchmark Values for Ra-226 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
50
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
1.5
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
8.2
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
8.4
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
15
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
34
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
54
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
79
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
82
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
84
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
160
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
340
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
370
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
380
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
510
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
540
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
790
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
930
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
1600
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
3700
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
3800
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
5100
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
9300
0.1
1
10
100
1,000
10,000
Value (pCi/g)

Table 147: Benchmark Values for Ra−228 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	40.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	1.2	3
LANL ECORISK	Rad Soil No Effect	American robin	11.0	
LANL ECORISK	Rad Soil No Effect	American robin	11.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	12.0	3
LANL ECORISK	Rad Soil No Effect	American robin	46.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	48.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	100.0	
LANL ECORISK	Rad Soil Low Effect	American robin	110.0	
LANL ECORISK	Rad Soil Low Effect	American robin	110.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	170.0	
LANL ECORISK	Rad Soil Low Effect	American robin	460.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	480.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	490.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	560.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	770.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	1000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1600.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	1700.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	4900.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	5600.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	7700.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	16000.0	

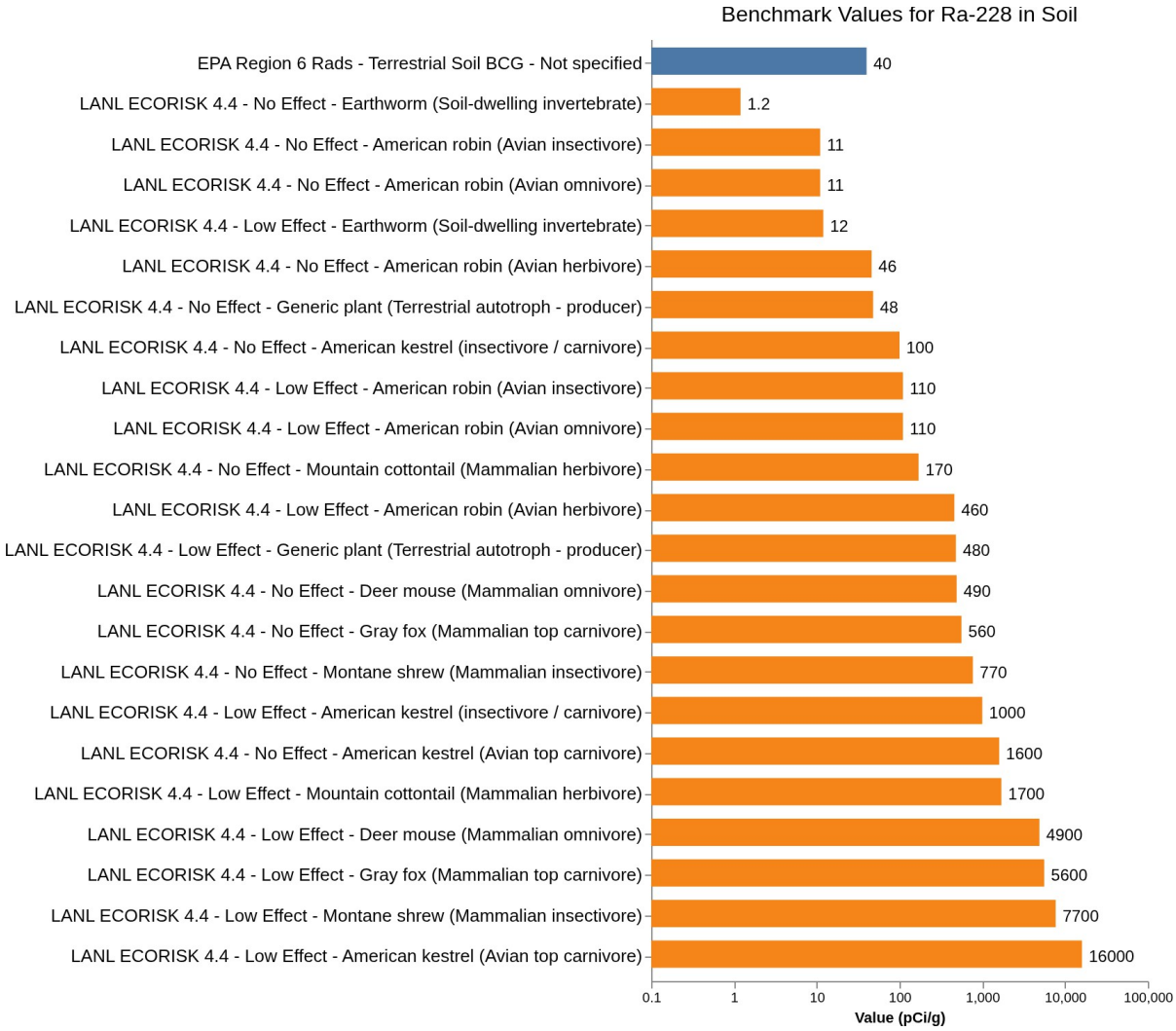


Table 148: Benchmark Values for Sb−125 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	3000.0	

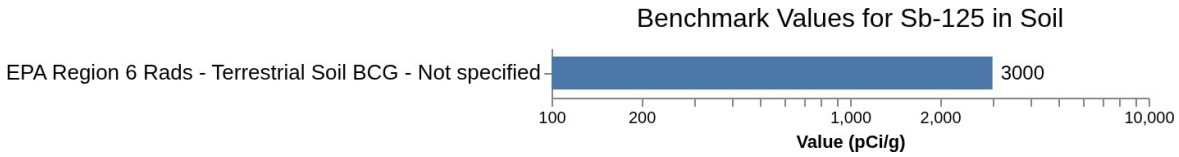


Table 149: Benchmark Values for Sr−90 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	20.0	
LANL ECORISK	Rad Soil No Effect	American robin	340.0	2, 3
LANL ECORISK	Rad Soil No Effect	American robin	790.0	2
LANL ECORISK	Rad Soil No Effect	Gray fox	800.0	2
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1100.0	2
LANL ECORISK	Rad Soil No Effect	Generic plant	1100.0	2
LANL ECORISK	Rad Soil No Effect	Deer mouse	1600.0	2
LANL ECORISK	Rad Soil No Effect	Earthworm	1700.0	2
LANL ECORISK	Rad Soil No Effect	Montane shrew	1700.0	2
LANL ECORISK	Rad Soil No Effect	American kestrel	2000.0	2
LANL ECORISK	Rad Soil No Effect	American kestrel	2500.0	2
LANL ECORISK	Rad Soil No Effect	American robin	2800.0	2
LANL ECORISK	Rad Soil Low Effect	American robin	3400.0	2, 3
LANL ECORISK	Rad Soil Low Effect	American robin	7900.0	2
LANL ECORISK	Rad Soil Low Effect	Gray fox	8000.0	2
LANL ECORISK	Rad Soil Low Effect	Generic plant	11000.0	2
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	11000.0	2
LANL ECORISK	Rad Soil Low Effect	Deer mouse	16000.0	2
LANL ECORISK	Rad Soil Low Effect	Earthworm	17000.0	2
LANL ECORISK	Rad Soil Low Effect	Montane shrew	17000.0	2
LANL ECORISK	Rad Soil Low Effect	American kestrel	20000.0	2
LANL ECORISK	Rad Soil Low Effect	American kestrel	25000.0	2
LANL ECORISK	Rad Soil Low Effect	American robin	28000.0	2

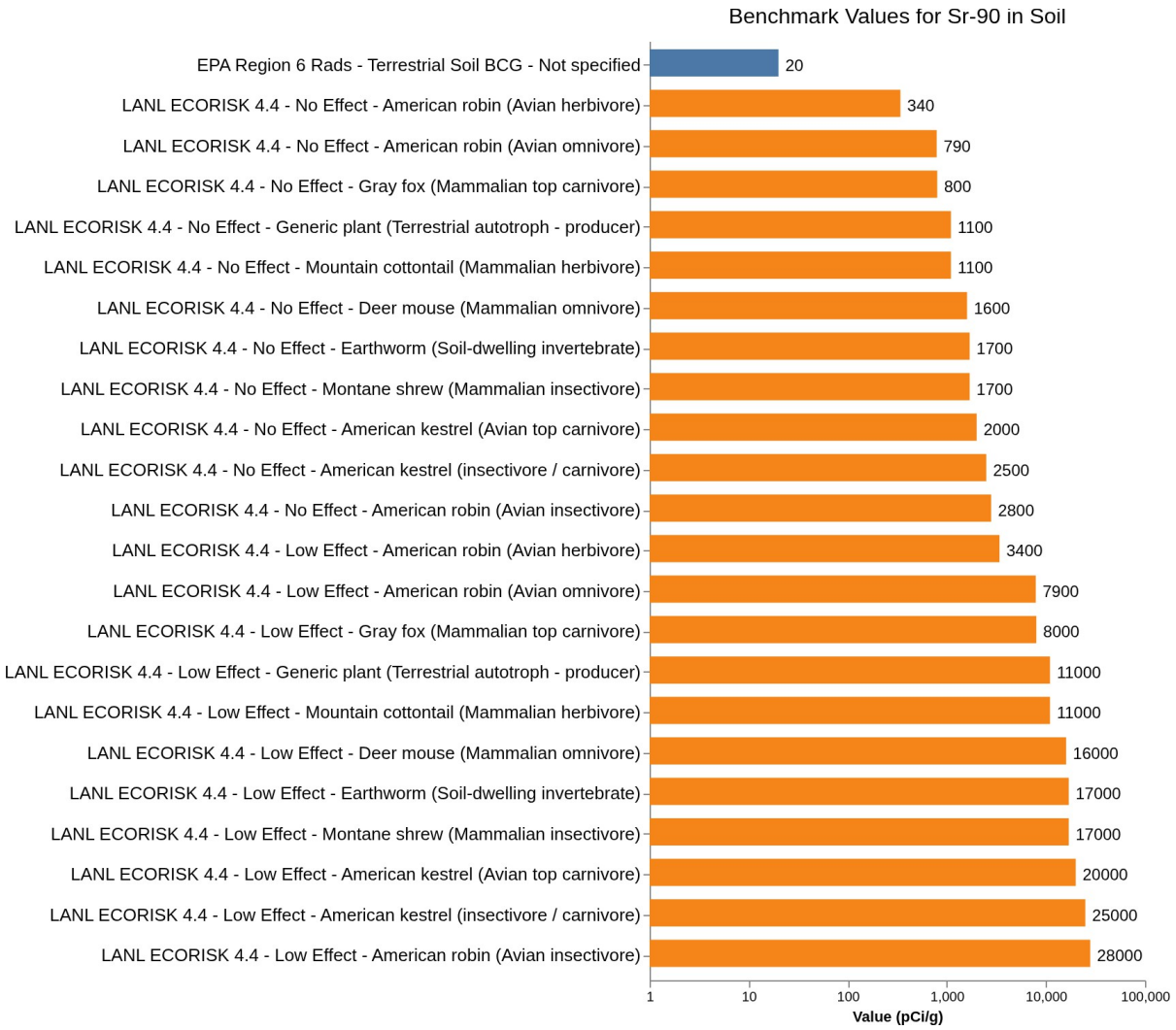

Benchmark Values for Sr-90 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
20
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
340
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
790
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
800
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
1100
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
1100
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
1600
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
1700
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
1700
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
2000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
2500
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
2800
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
3400
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
7900
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
8000
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
11000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
11000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
16000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
17000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
17000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
20000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
25000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
28000
1
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 150: Benchmark Values for Tc−99 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	4000.0	

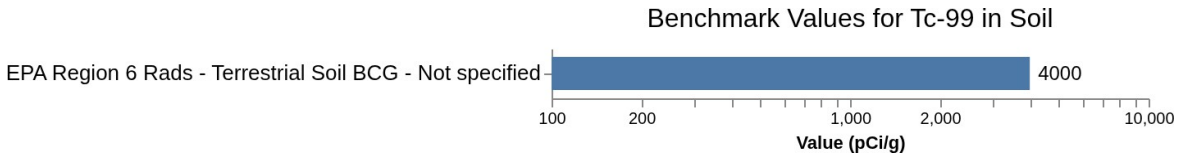


Table 151: Benchmark Values for Th−228 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	43.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	140.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	430.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	770.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	820.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	830.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	830.0	
LANL ECORISK	Rad Soil No Effect	American robin	1100.0	
LANL ECORISK	Rad Soil No Effect	American robin	1200.0	
LANL ECORISK	Rad Soil No Effect	American robin	1300.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	1400.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1600.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	1600.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	7700.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	8200.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	8300.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	8300.0	
LANL ECORISK	Rad Soil Low Effect	American robin	11000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	12000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	13000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	16000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	16000.0	

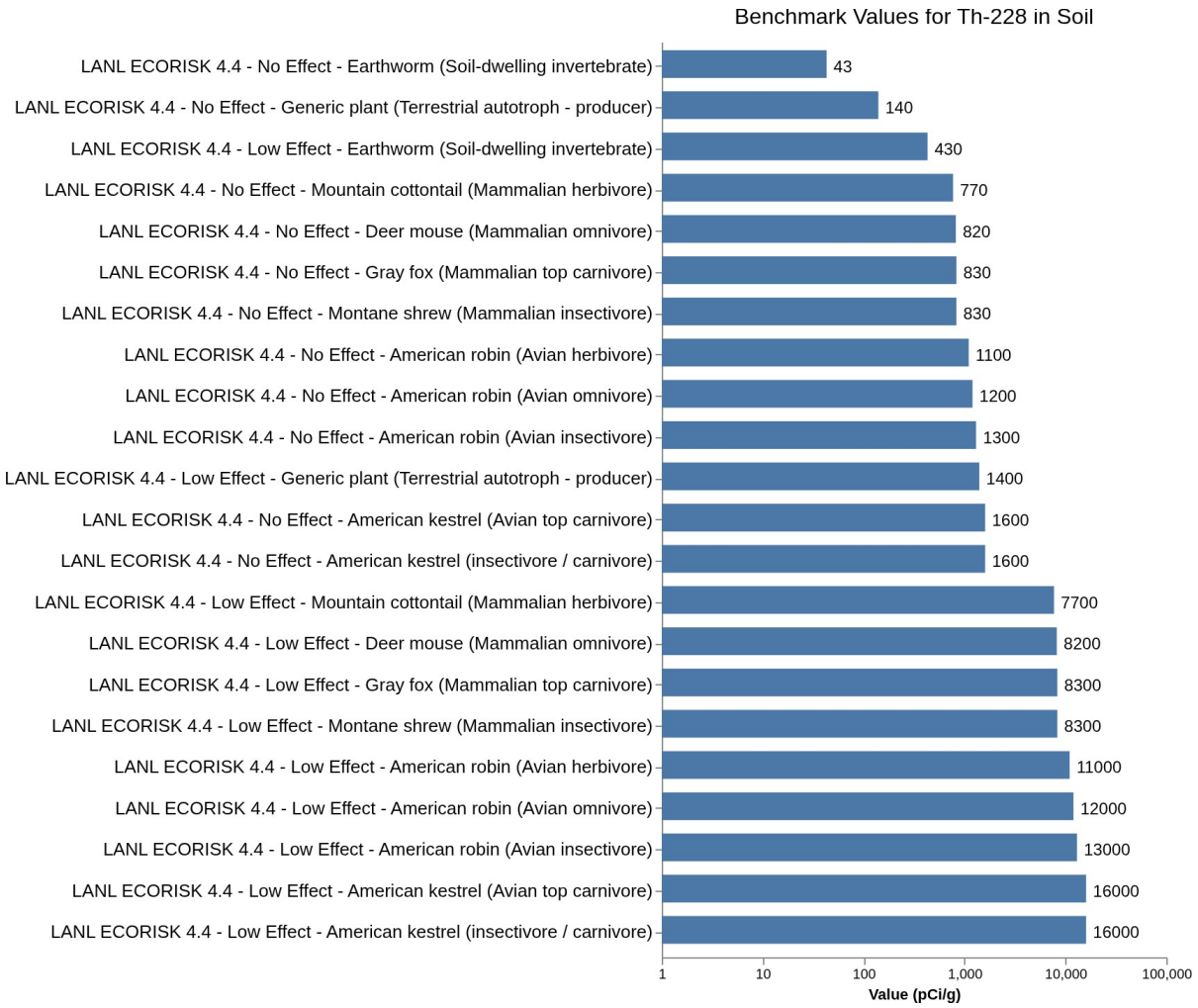

Benchmark Values for Th-228 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
43
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
140
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
430
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
770
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
820
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
830
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
830
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
1100
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
1200
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
1300
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
1400
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
1600
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
1600
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
7700
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
8200
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
8300
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
8300
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
11000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
12000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
13000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
16000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
16000
1
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 152: Benchmark Values for Th−229 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	47.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	170.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	470.0	3
LANL ECORISK	Rad Soil No Effect	American robin	850.0	
LANL ECORISK	Rad Soil No Effect	American robin	950.0	
LANL ECORISK	Rad Soil No Effect	American robin	1200.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1300.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	1500.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	1500.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	1500.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	1700.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	2700.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	3100.0	
LANL ECORISK	Rad Soil Low Effect	American robin	8500.0	
LANL ECORISK	Rad Soil Low Effect	American robin	9500.0	
LANL ECORISK	Rad Soil Low Effect	American robin	12000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	13000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	15000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	15000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	15000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	27000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	31000.0	

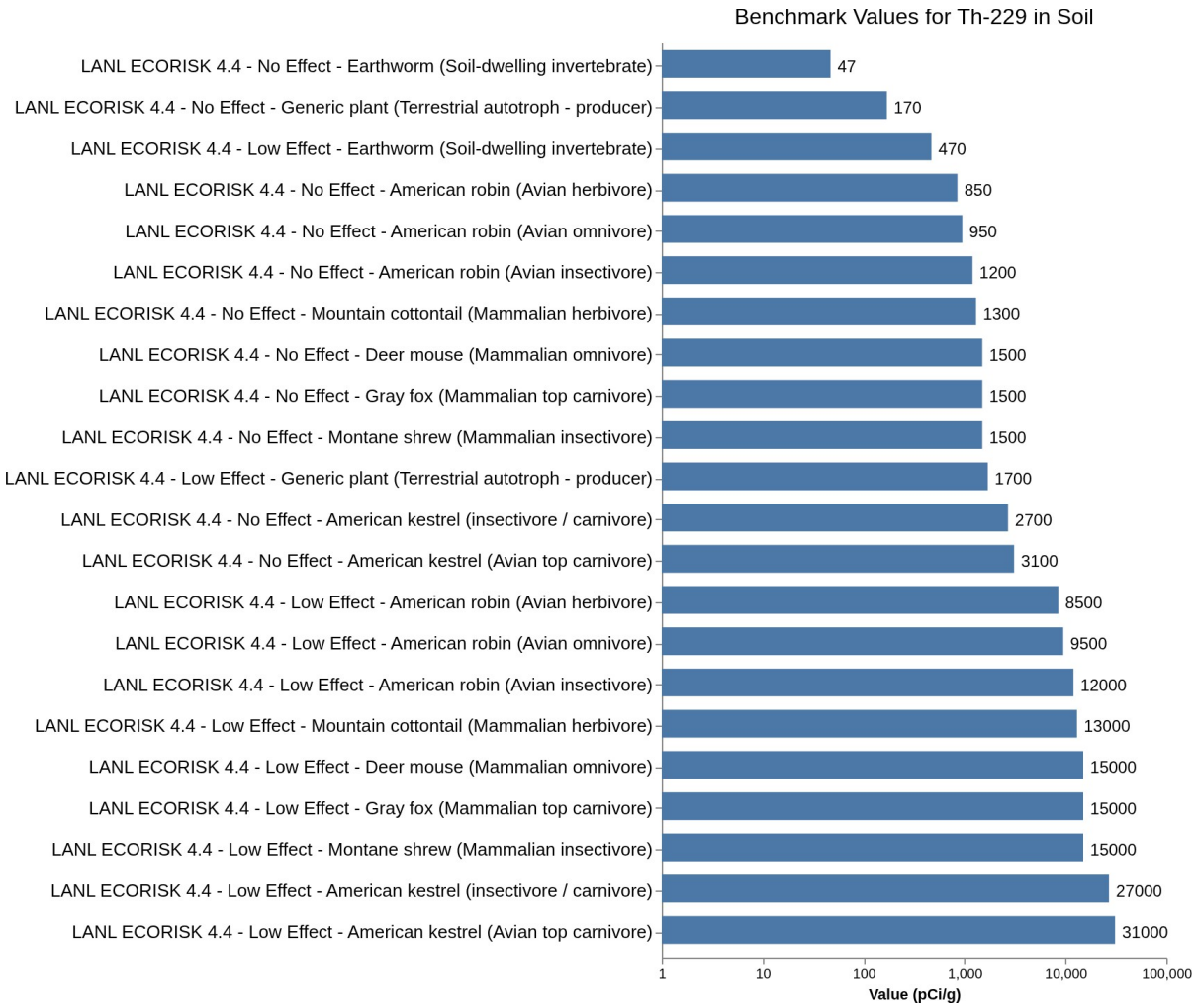

Benchmark Values for Th-229 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
47
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
170
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
470
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
850
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
950
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
1200
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
1300
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
1500
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
1500
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
1500
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
1700
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
2700
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
3100
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
8500
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
9500
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
12000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
13000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
15000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
15000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
15000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
27000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
31000
1
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 153: Benchmark Values for Th−230 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Earthworm	52.0	3
LANL ECORISK	Rad Soil No Effect	Generic plant	200.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	520.0	3
LANL ECORISK	Rad Soil No Effect	American robin	1200.0	
LANL ECORISK	Rad Soil No Effect	American robin	1400.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	2000.0	
LANL ECORISK	Rad Soil No Effect	American robin	2200.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	9400.0	
LANL ECORISK	Rad Soil Low Effect	American robin	12000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	14000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	22000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	22000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	68000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	78000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	94000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	110000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	170000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	220000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	680000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	780000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	1100000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	1700000.0	

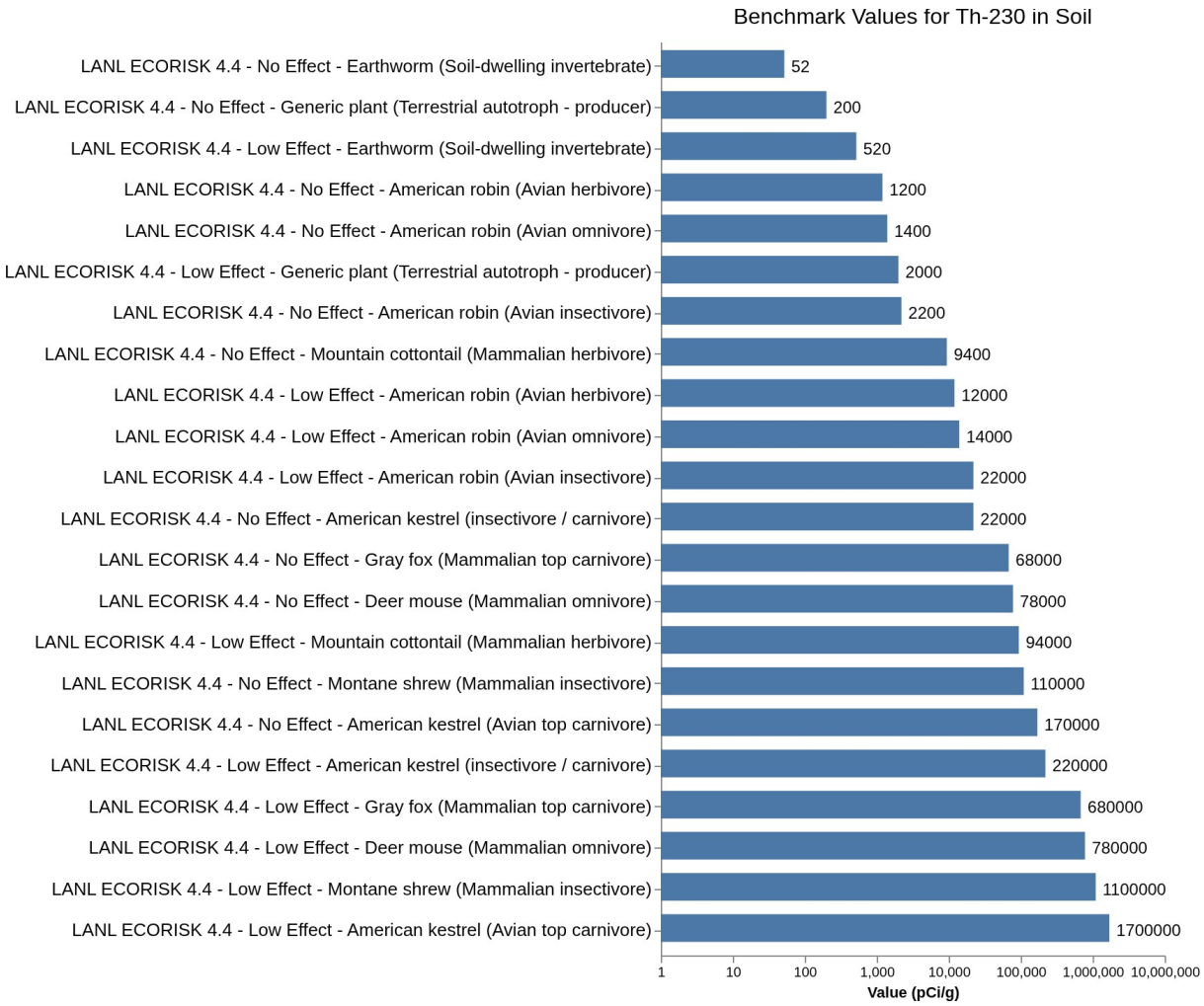

Benchmark Values for Th-230 in Soil
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
52
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
200
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
520
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
1200
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
1400
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
2000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
2200
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
9400
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
12000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
14000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
22000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
22000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
68000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
78000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
94000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
110000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
170000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
220000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
680000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
780000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
1100000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
1700000
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 154: Benchmark Values for Th−232 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	2000.0	
LANL ECORISK	Rad Soil No Effect	Earthworm	6.2	3
LANL ECORISK	Rad Soil No Effect	Generic plant	24.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	62.0	3
LANL ECORISK	Rad Soil No Effect	American robin	150.0	
LANL ECORISK	Rad Soil No Effect	American robin	170.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	240.0	
LANL ECORISK	Rad Soil No Effect	American robin	260.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1100.0	
LANL ECORISK	Rad Soil Low Effect	American robin	1500.0	
LANL ECORISK	Rad Soil Low Effect	American robin	1700.0	
LANL ECORISK	Rad Soil Low Effect	American robin	2600.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	2900.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	11000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	14000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	19000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	29000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	50000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	51000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	140000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	190000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	500000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	510000.0	

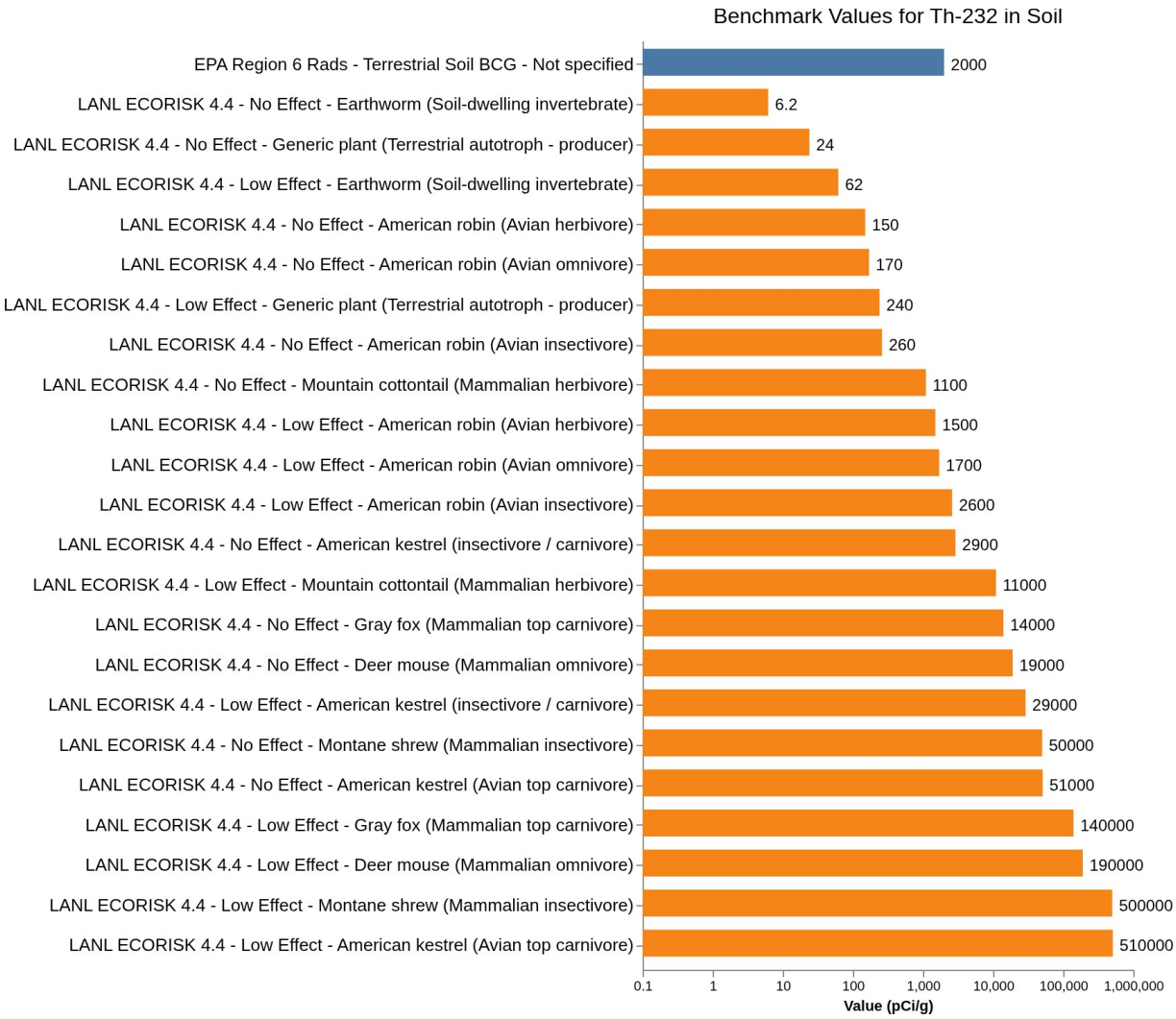

Benchmark Values for Th-232 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
2000
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
6.2
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
24
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
62
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
150
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
170
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
240
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
260
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
1100
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
1500
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
1700
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
2600
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
2900
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
11000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
14000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
19000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
29000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
50000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
51000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
140000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
190000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
500000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
510000
0.1
1
10
100
1,000
10,000
100,000
1,000,000
Value (pCi/g)

Table 155: Benchmark Values for U−233 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	5000.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	440.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	2200.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	4400.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	13000.0	
LANL ECORISK	Rad Soil No Effect	American robin	14000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	22000.0	
LANL ECORISK	Rad Soil No Effect	American robin	28000.0	
LANL ECORISK	Rad Soil No Effect	American robin	82000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	130000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	140000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	230000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	280000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	290000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	510000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	690000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	710000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	820000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	2300000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	2900000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	5100000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	6900000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	7100000.0	

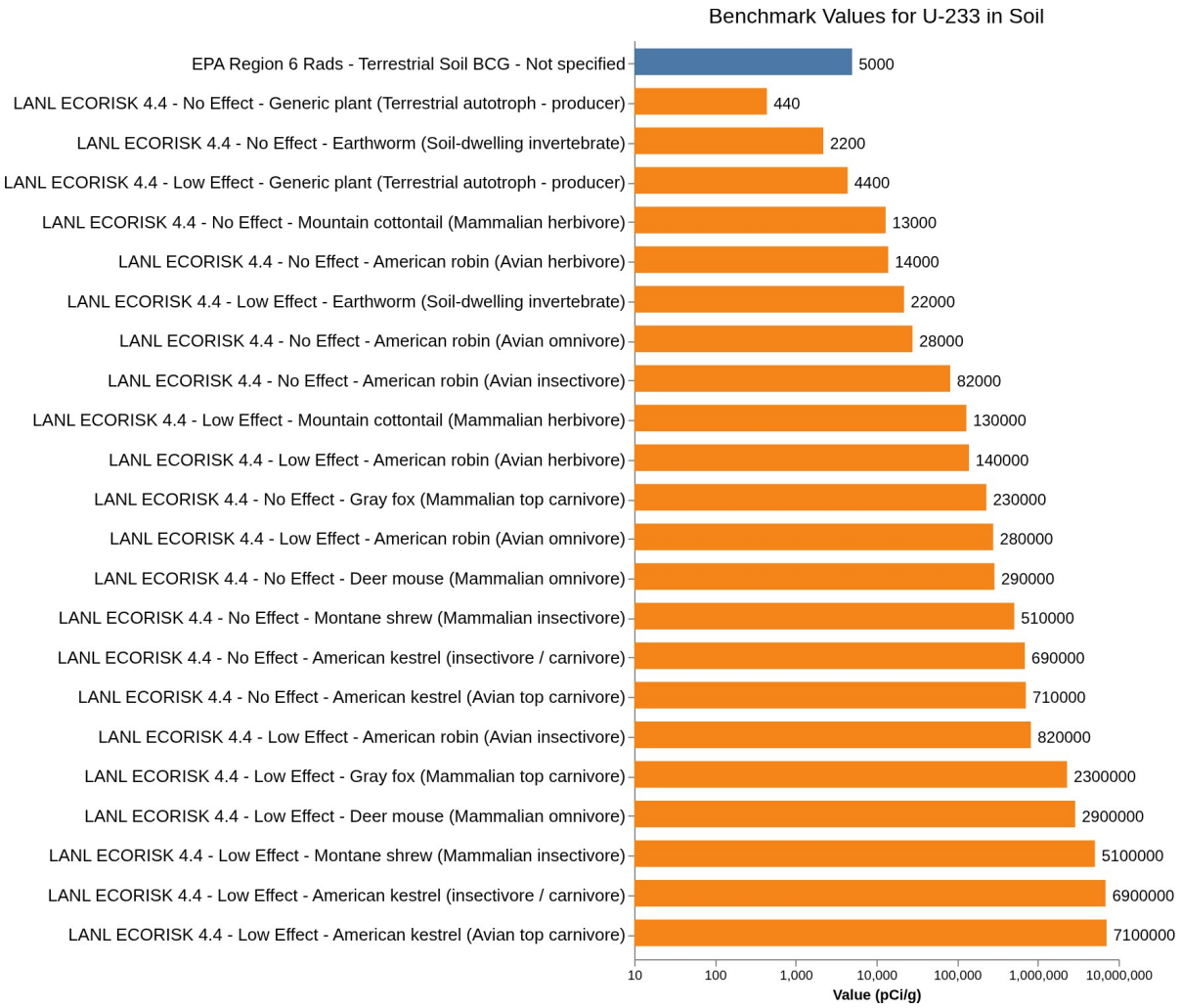

Benchmark Values for U-233 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
5000
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
440
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
2200
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
4400
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
13000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
14000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
22000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
28000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
82000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
130000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
140000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
230000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
280000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
290000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
510000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
690000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
710000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
820000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
2300000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
2900000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
5100000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
6900000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
7100000
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 156: Benchmark Values for U−234 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	5000.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	440.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	2200.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	4400.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	12000.0	
LANL ECORISK	Rad Soil No Effect	American robin	14000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	22000.0	
LANL ECORISK	Rad Soil No Effect	American robin	27000.0	
LANL ECORISK	Rad Soil No Effect	American robin	69000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	110000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	120000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	120000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	140000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	150000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	260000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	260000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	270000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	690000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	1100000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	1200000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	1500000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	2600000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	2600000.0	

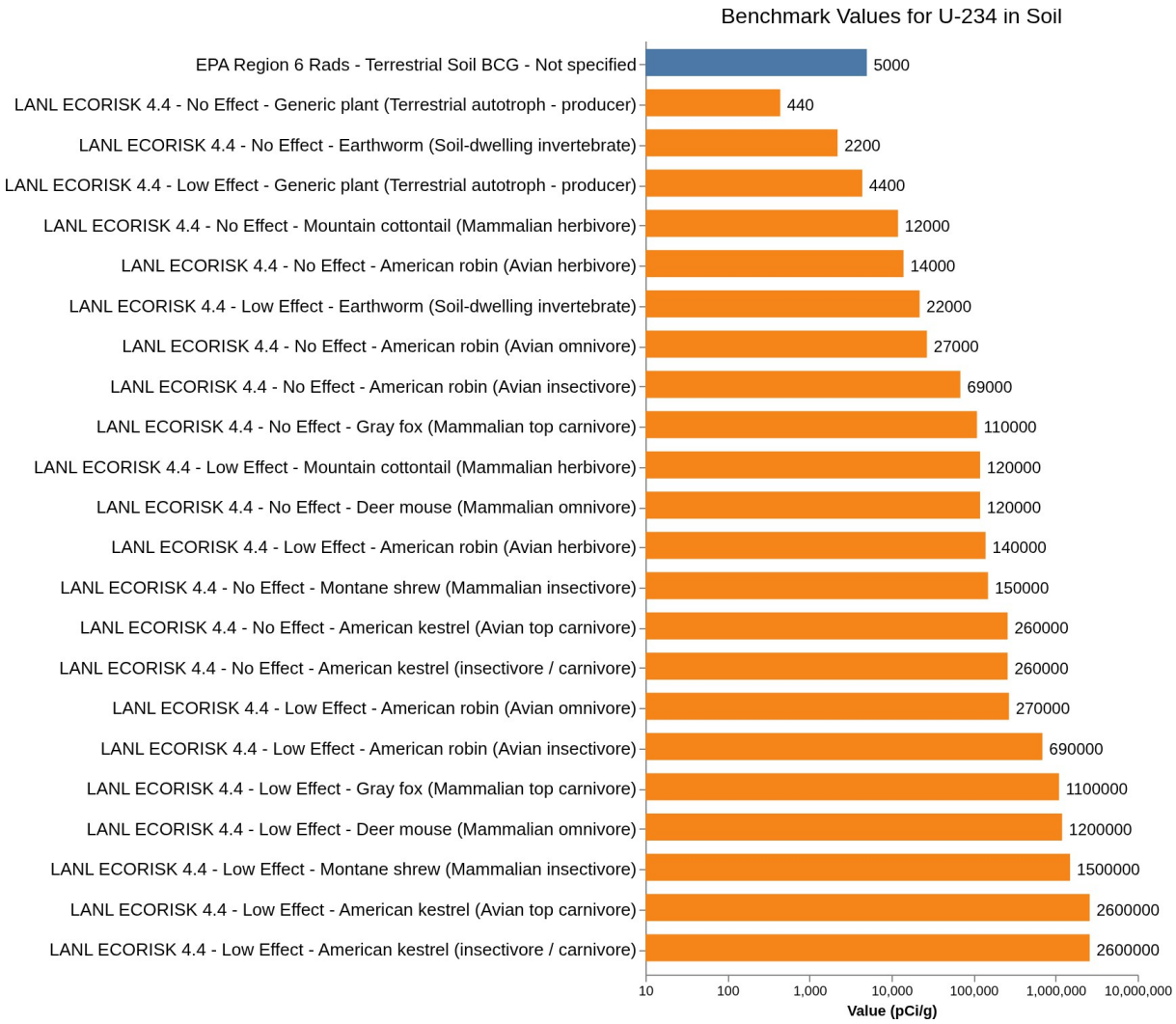

Benchmark Values for U-234 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
5000
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
440
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
2200
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
4400
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
12000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
14000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
22000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
27000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
69000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
110000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
120000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
120000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
140000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
150000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
260000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
260000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
270000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
690000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
1100000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
1200000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
1500000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
2600000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
2600000
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Value (pCi/g)

Table 157: Benchmark Values for U−235 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	3000.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	440.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	1600.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	3800.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	4400.0	3
LANL ECORISK	Rad Soil No Effect	Gray fox	5200.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	5200.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	5200.0	
LANL ECORISK	Rad Soil No Effect	American robin	6300.0	
LANL ECORISK	Rad Soil No Effect	American robin	7900.0	
LANL ECORISK	Rad Soil No Effect	American robin	9500.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	10000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	16000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	38000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	52000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	52000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	52000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	63000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	79000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	95000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	100000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	100000.0	

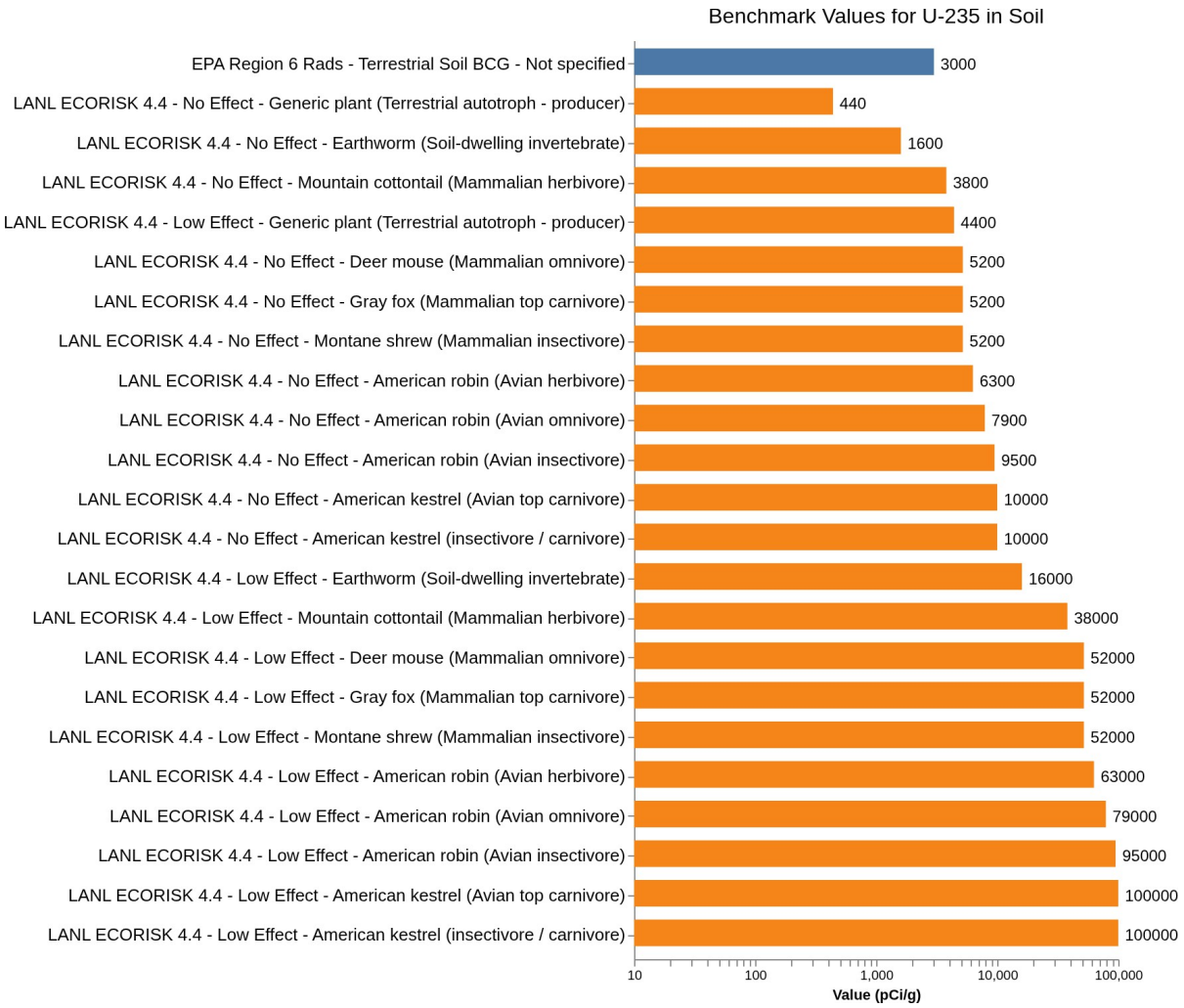

Benchmark Values for U-235 in Soil
EPA Region 6 Rads - Terrestrial Soil BCG - Not specified
3000
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
440
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
1600
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
3800
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
4400
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
5200
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
5200
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
5200
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
6300
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
7900
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
9500
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
10000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
10000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
16000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
38000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
52000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
52000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
52000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
63000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
79000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
95000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
100000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
100000
10
100
1,000
10,000
100,000
Value (pCi/g)

Table 158: Benchmark Values for U−236 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
LANL ECORISK	Rad Soil No Effect	Generic plant	470.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	2400.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	4700.0	3
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	14000.0	
LANL ECORISK	Rad Soil No Effect	American robin	15000.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	24000.0	
LANL ECORISK	Rad Soil No Effect	American robin	31000.0	
LANL ECORISK	Rad Soil No Effect	American robin	96000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	140000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	150000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	310000.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	440000.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	720000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	950000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	2200000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	2300000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	4400000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	7200000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	22000000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	23000000.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	34000000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	340000000.0	

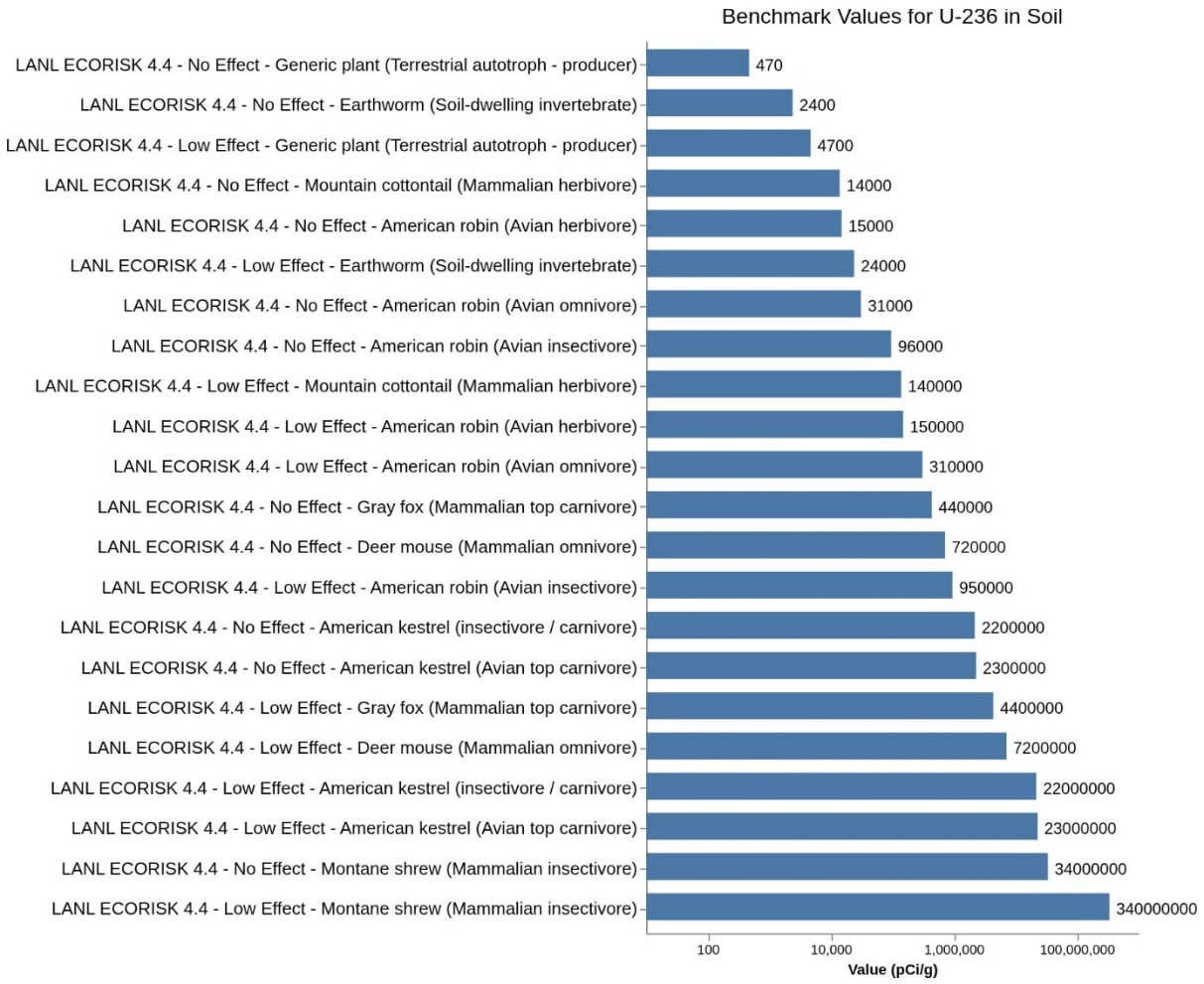

Benchmark Values for U-236 in Soil
LANL ECORISK 4.4 - No Effect - Generic plant (Terrestrial autotroph - producer)
470
LANL ECORISK 4.4 - No Effect - Earthworm (Soil-dwelling invertebrate)
2400
LANL ECORISK 4.4 - Low Effect - Generic plant (Terrestrial autotroph - producer)
4700
LANL ECORISK 4.4 - No Effect - Mountain cottontail (Mammalian herbivore)
14000
LANL ECORISK 4.4 - No Effect - American robin (Avian herbivore)
15000
LANL ECORISK 4.4 - Low Effect - Earthworm (Soil-dwelling invertebrate)
24000
LANL ECORISK 4.4 - No Effect - American robin (Avian omnivore)
31000
LANL ECORISK 4.4 - No Effect - American robin (Avian insectivore)
96000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail (Mammalian herbivore)
140000
LANL ECORISK 4.4 - Low Effect - American robin (Avian herbivore)
150000
LANL ECORISK 4.4 - Low Effect - American robin (Avian omnivore)
310000
LANL ECORISK 4.4 - No Effect - Gray fox (Mammalian top carnivore)
440000
LANL ECORISK 4.4 - No Effect - Deer mouse (Mammalian omnivore)
720000
LANL ECORISK 4.4 - Low Effect - American robin (Avian insectivore)
950000
LANL ECORISK 4.4 - No Effect - American kestrel (insectivore / carnivore)
2200000
LANL ECORISK 4.4 - No Effect - American kestrel (Avian top carnivore)
2300000
LANL ECORISK 4.4 - Low Effect - Gray fox (Mammalian top carnivore)
4400000
LANL ECORISK 4.4 - Low Effect - Deer mouse (Mammalian omnivore)
7200000
LANL ECORISK 4.4 - Low Effect - American kestrel (insectivore / carnivore)
22000000
LANL ECORISK 4.4 - Low Effect - American kestrel (Avian top carnivore)
23000000
LANL ECORISK 4.4 - No Effect - Montane shrew (Mammalian insectivore)
34000000
LANL ECORISK 4.4 - Low Effect - Montane shrew (Mammalian insectivore)
340000000
100
10,000
1,000,000
100,000,000
Value (pCi/g)

Table 159: Benchmark Values for U−238 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	2000.0	
LANL ECORISK	Rad Soil No Effect	Generic plant	400.0	3
LANL ECORISK	Rad Soil No Effect	Earthworm	1100.0	
LANL ECORISK	Rad Soil No Effect	Mountain cottontail	1800.0	
LANL ECORISK	Rad Soil No Effect	Deer mouse	2100.0	
LANL ECORISK	Rad Soil No Effect	Gray fox	2100.0	
LANL ECORISK	Rad Soil No Effect	Montane shrew	2100.0	
LANL ECORISK	Rad Soil No Effect	American robin	3300.0	
LANL ECORISK	Rad Soil No Effect	American robin	3700.0	
LANL ECORISK	Rad Soil Low Effect	Generic plant	4000.0	3
LANL ECORISK	Rad Soil No Effect	American robin	4000.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	4200.0	
LANL ECORISK	Rad Soil No Effect	American kestrel	4200.0	
LANL ECORISK	Rad Soil Low Effect	Earthworm	11000.0	
LANL ECORISK	Rad Soil Low Effect	Mountain cottontail	18000.0	
LANL ECORISK	Rad Soil Low Effect	Deer mouse	21000.0	
LANL ECORISK	Rad Soil Low Effect	Gray fox	21000.0	
LANL ECORISK	Rad Soil Low Effect	Montane shrew	21000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	33000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	37000.0	
LANL ECORISK	Rad Soil Low Effect	American robin	40000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	42000.0	
LANL ECORISK	Rad Soil Low Effect	American kestrel	42000.0	

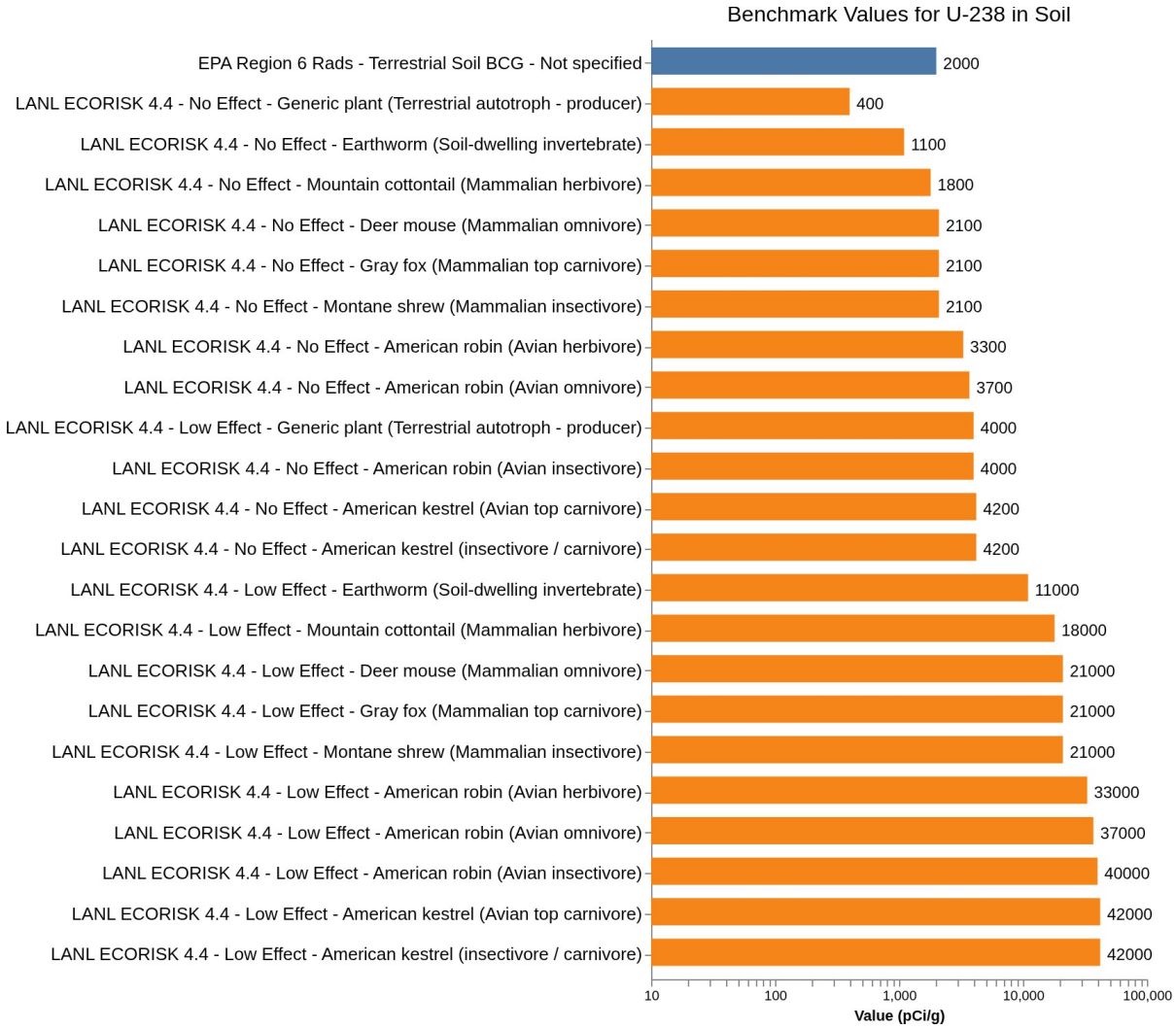


Table 160: Benchmark Values for Zn−65 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	400.0	

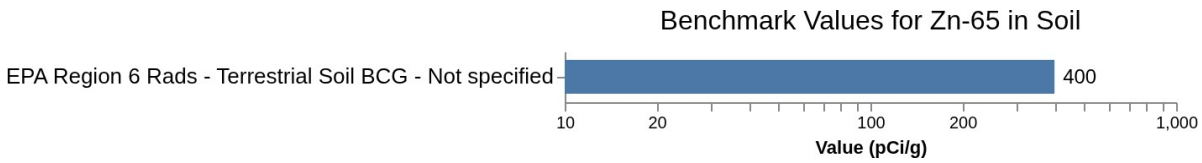
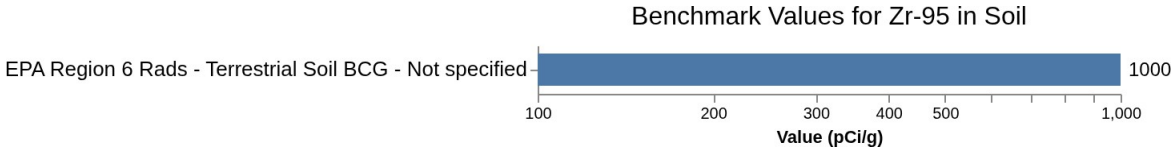


Table 161: Benchmark Values for Zr−95 in Soil

Source	Benchmark	Organism	Value (pCi/g)	Footnotes
EPA Region 6	Rads − Terrestrial Soil BCG	Not specified	1000.0	



9. RADIONUCLIDE BENCHMARKS FOR SURFACE WATER

Table 162: Benchmark Values for Am−241 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	4.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	5.700000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	5.700000e+07	
LANL ECORISK	Rad Surface Water No Effect	Algae	6.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	6.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	6.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	Fish	6.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	American robin	7.500000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	7.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1.400000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Fish	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Algae	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American robin	7.500000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	7.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	8.500000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	1.300000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	1.400000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	2.100000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	8.500000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	1.300000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	2.100000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.900000e+10	

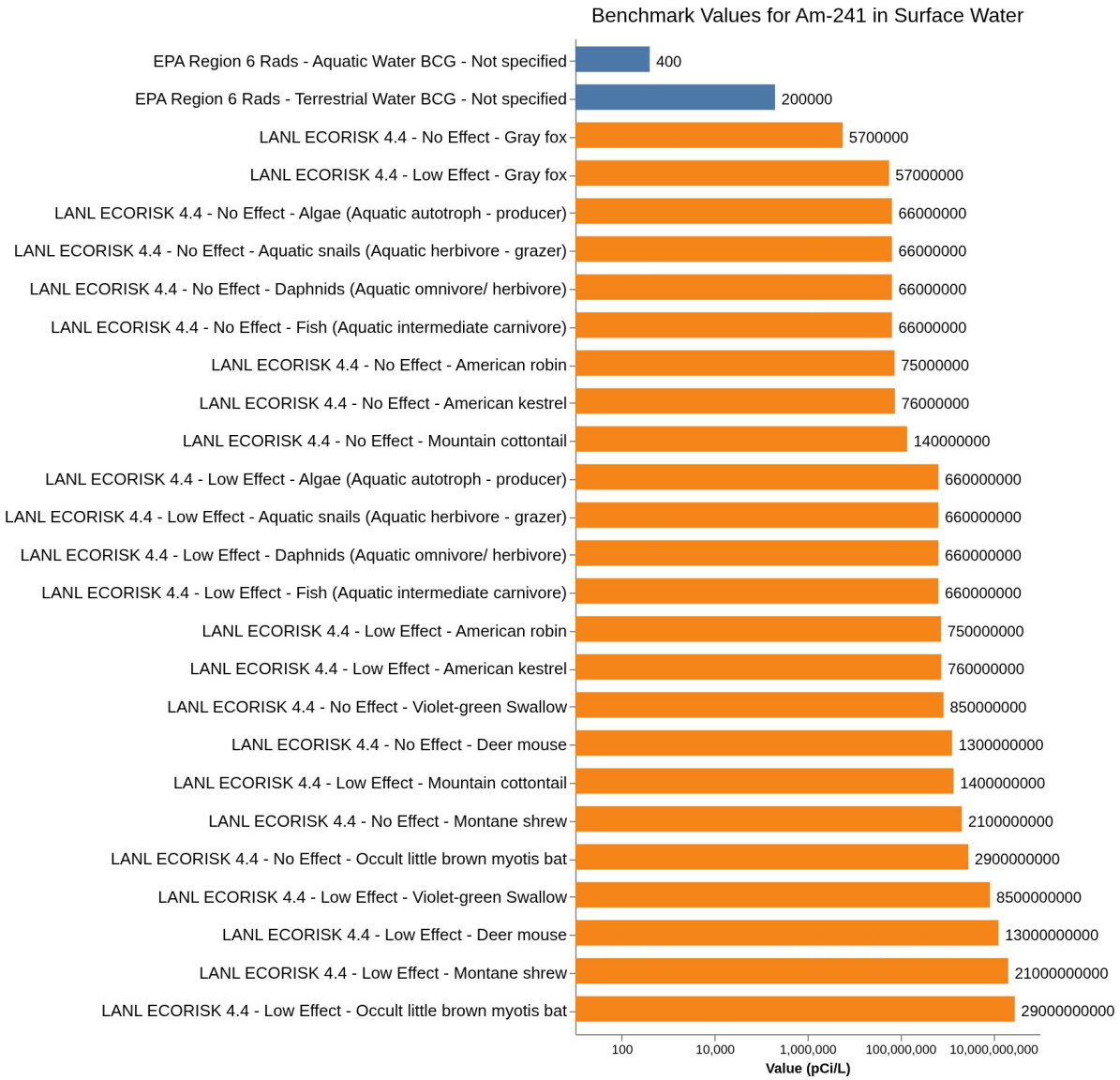


Table 163: Benchmark Values for Ce−144 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	3000000.0	

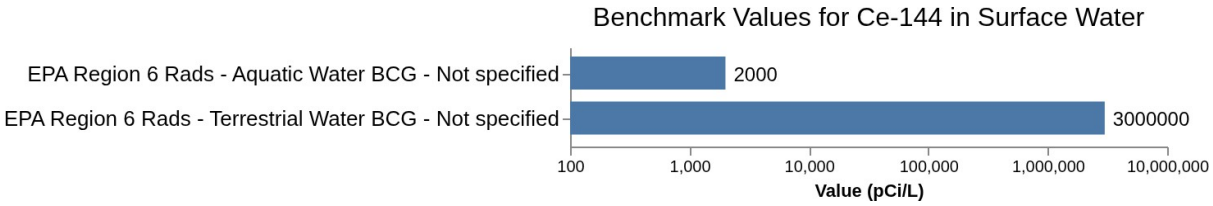


Table 164: Benchmark Values for Co−60 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	4.000000e+03	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	1.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Algae	1.400000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.400000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.400000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	1.400000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.400000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.400000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.400000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.400000e+07	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	9.600000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	5.300000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	9.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	1.800000e+09	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1.900000e+09	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	3.400000e+09	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	3.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	5.300000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.000000e+10	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.200000e+10	
LANL ECORISK	Rad Surface Water Low Effect	American robin	1.800000e+10	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	1.900000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	3.400000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	3.900000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.000000e+11	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.200000e+11	

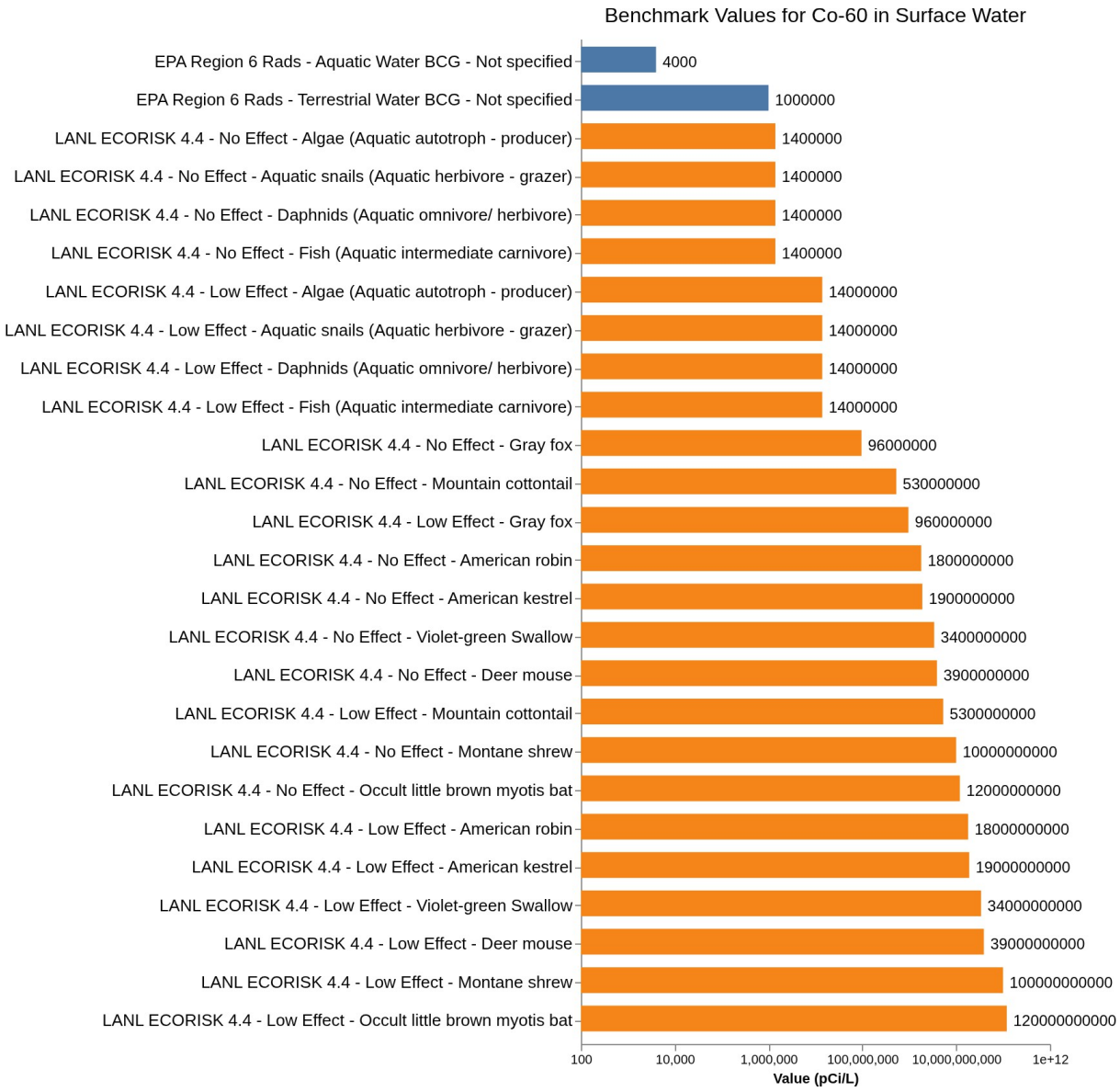

Benchmark Values for Co-60 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
4000
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
1000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
1400000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
1400000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
1400000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
1400000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
14000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
14000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
14000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
14000000
LANL ECORISK 4.4 - No Effect - Gray fox
96000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
530000000
LANL ECORISK 4.4 - Low Effect - Gray fox
960000000
LANL ECORISK 4.4 - No Effect - American robin
1800000000
LANL ECORISK 4.4 - No Effect - American kestrel
1900000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
3400000000
LANL ECORISK 4.4 - No Effect - Deer mouse
3900000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
5300000000
LANL ECORISK 4.4 - No Effect - Montane shrew
10000000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
12000000000
LANL ECORISK 4.4 - Low Effect - American robin
18000000000
LANL ECORISK 4.4 - Low Effect - American kestrel
19000000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
34000000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
39000000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
100000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
120000000000
100
10,000
1,000,000
100,000,000
10,000,000,000
1e+12
Value (pCi/L)

Table 165: Benchmark Values for Cs−134 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	2.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	2.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	2.200000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	2.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	7.500000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Algae	2.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	2.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	2.200000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	2.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	4.300000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	7.500000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	1.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	3.300000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	4.300000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	8.300000e+08	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	1.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	1.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	3.300000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	8.300000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.000000e+10	

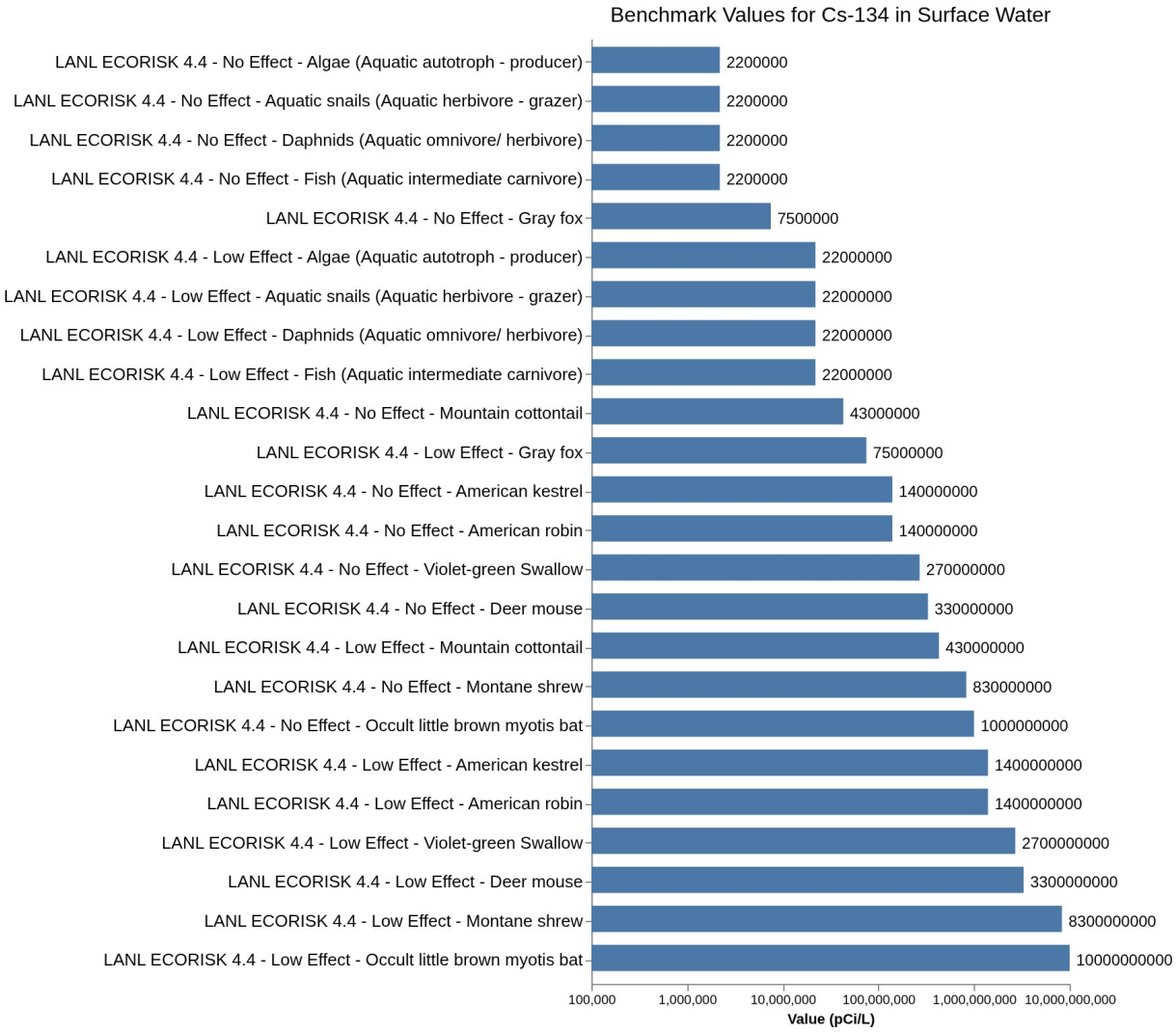


Table 166: Benchmark Values for Cs−135 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	500.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	8000000.0	

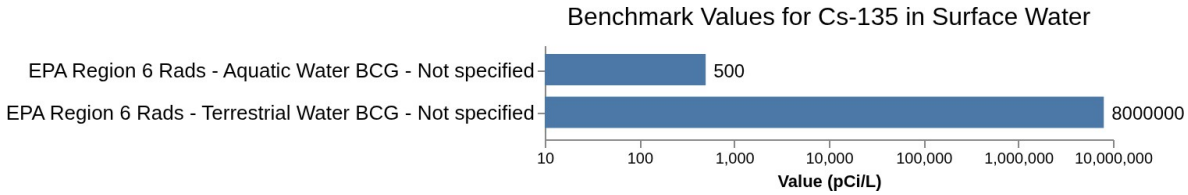


Table 167: Benchmark Values for Cs−137 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	4.000000e+01	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	6.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Algae	5.000000e+06	1
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	5.000000e+06	1
LANL ECORISK	Rad Surface Water No Effect	Daphnids	5.000000e+06	1, 3
LANL ECORISK	Rad Surface Water No Effect	Fish	5.000000e+06	1
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.600000e+07	1
LANL ECORISK	Rad Surface Water Low Effect	Algae	5.000000e+07	1
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	5.000000e+07	1
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	5.000000e+07	1, 3
LANL ECORISK	Rad Surface Water Low Effect	Fish	5.000000e+07	1
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	9.500000e+07	1
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.600000e+08	1
LANL ECORISK	Rad Surface Water No Effect	American kestrel	3.100000e+08	1
LANL ECORISK	Rad Surface Water No Effect	American robin	3.100000e+08	1
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	6.000000e+08	1
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	7.300000e+08	1
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	9.500000e+08	1
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.800000e+09	1
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.200000e+09	1
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	3.100000e+09	1
LANL ECORISK	Rad Surface Water Low Effect	American robin	3.100000e+09	1
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	6.000000e+09	1
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	7.300000e+09	1
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.800000e+10	1
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.200000e+10	1

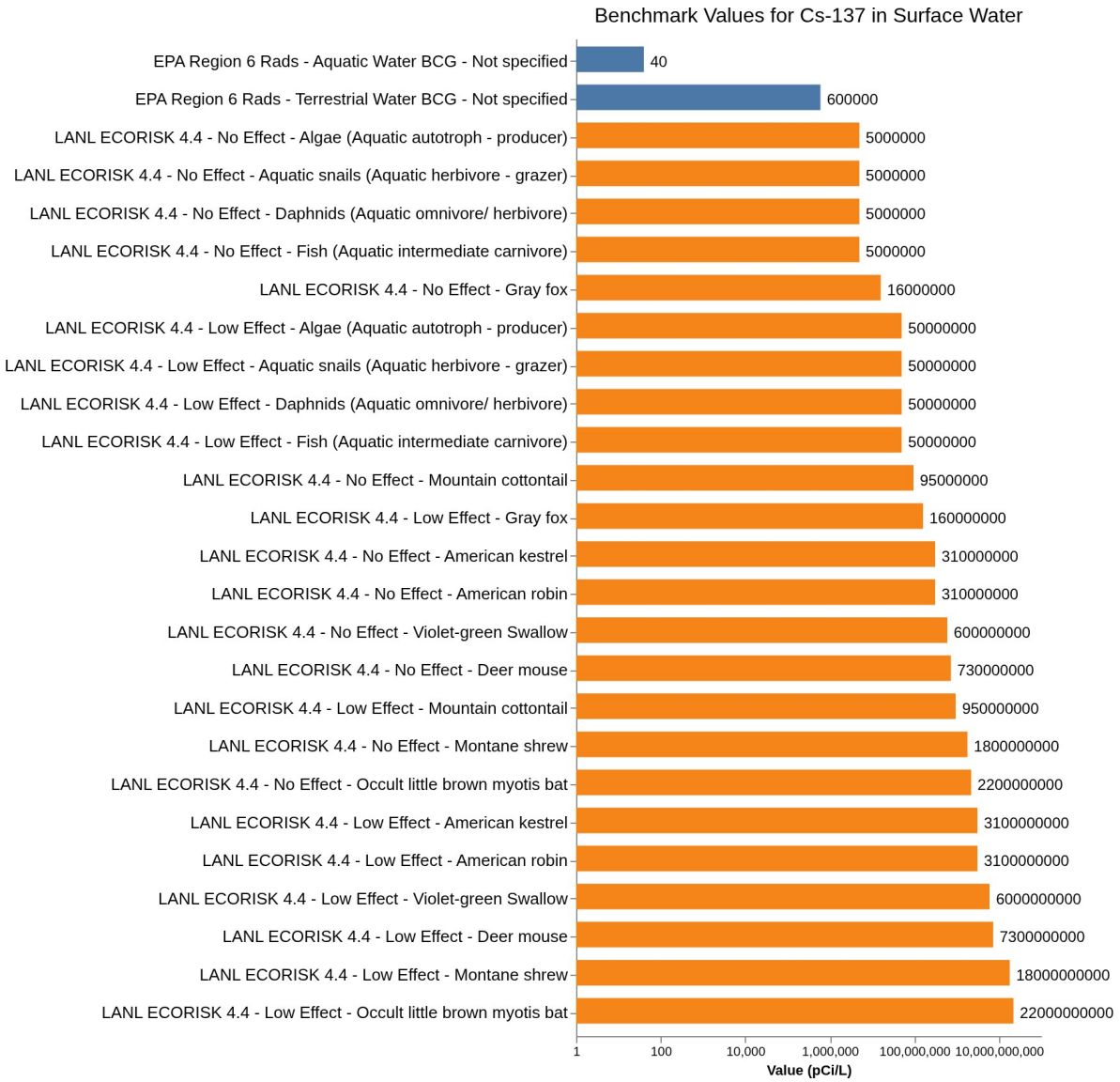

Benchmark Values for Cs-137 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
40
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
600000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
5000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
5000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
5000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
5000000
LANL ECORISK 4.4 - No Effect - Gray fox
16000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
50000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
50000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
50000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
50000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
95000000
LANL ECORISK 4.4 - Low Effect - Gray fox
160000000
LANL ECORISK 4.4 - No Effect - American kestrel
310000000
LANL ECORISK 4.4 - No Effect - American robin
310000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
600000000
LANL ECORISK 4.4 - No Effect - Deer mouse
730000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
950000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1800000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
2200000000
LANL ECORISK 4.4 - Low Effect - American kestrel
3100000000
LANL ECORISK 4.4 - Low Effect - American robin
3100000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
6000000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
7300000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
18000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
22000000000
1
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 168: Benchmark Values for Eu−152 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	1.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.000000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	1.000000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.000000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.000000e+07	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	2.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	8.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	1.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	1.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.200000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	2.300000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	8.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	1.200000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	2.300000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	3.000000e+10	

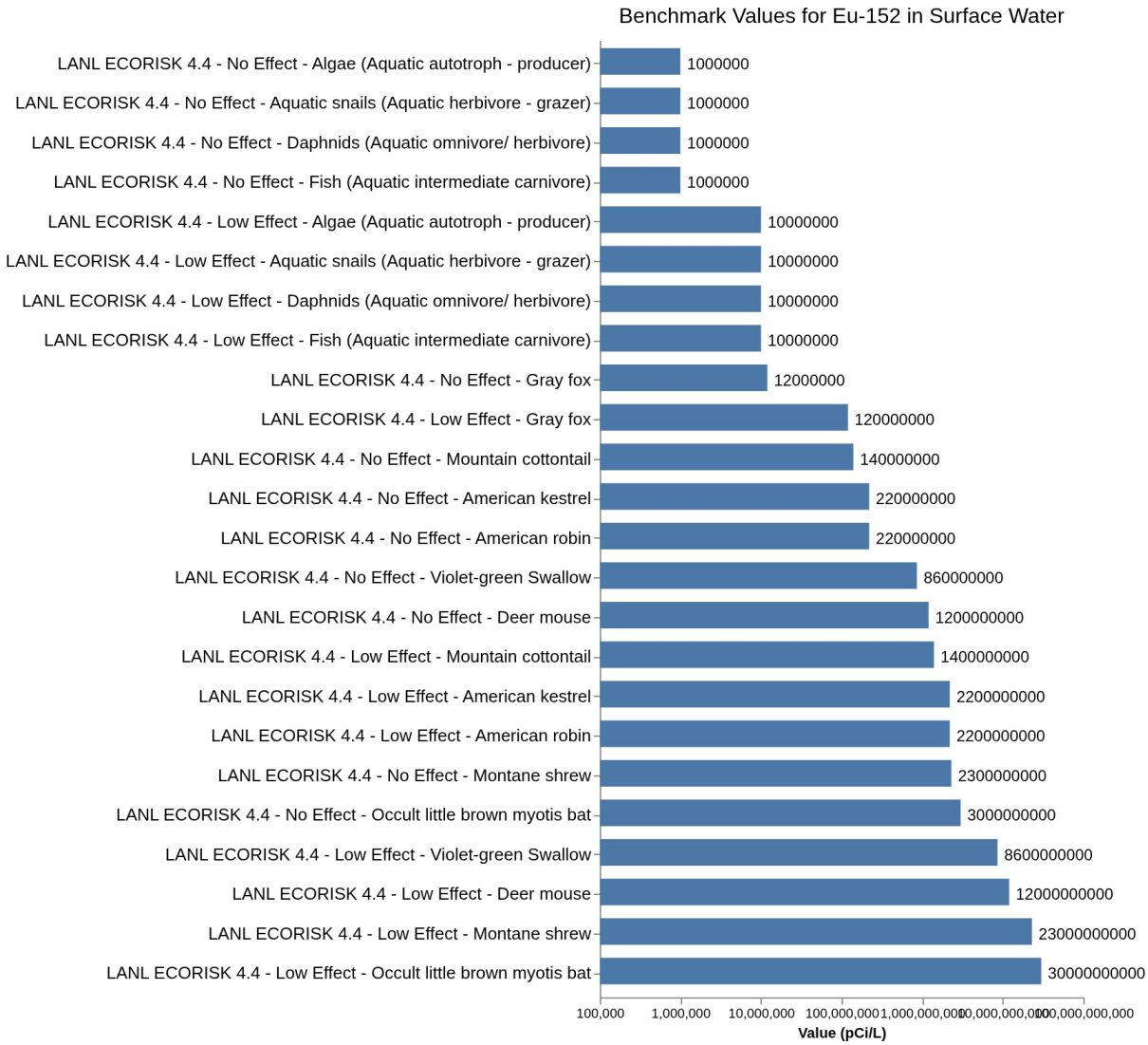


Table 169: Benchmark Values for Eu−154 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	20000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2000000.0	

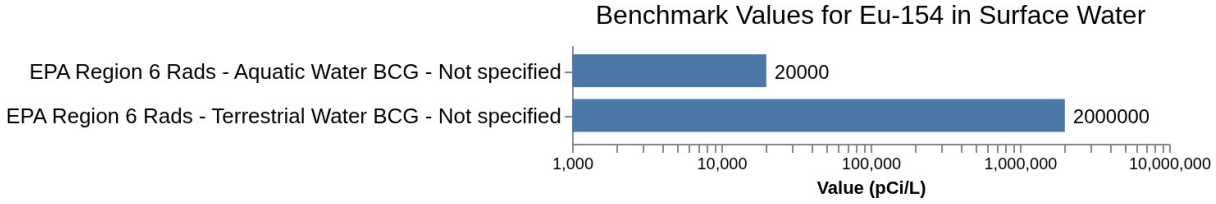


Table 170: Benchmark Values for Eu−155 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	300000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	30000000.0	

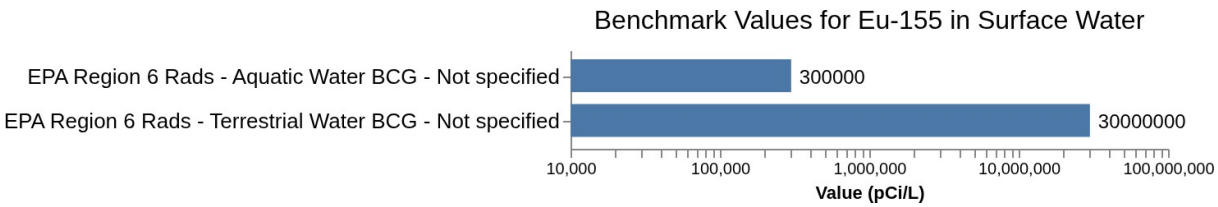


Table 171: Benchmark Values for H−3 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2.000000e+08	
EPA Region 6	Rads − Aquatic Water BCG	Not specified	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	6.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	6.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	6.600000e+08	3
LANL ECORISK	Rad Surface Water No Effect	Fish	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	6.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	6.600000e+09	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	6.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	6.600000e+09	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	6.800000e+10	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	3.700000e+11	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	6.800000e+11	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1.300000e+12	
LANL ECORISK	Rad Surface Water No Effect	American robin	1.300000e+12	3
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	2.400000e+12	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	2.700000e+12	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	3.700000e+12	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	7.400000e+12	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	8.900000e+12	
LANL ECORISK	Rad Surface Water Low Effect	American robin	1.300000e+13	3
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	1.300000e+13	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	2.400000e+13	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	2.700000e+13	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	7.400000e+13	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	8.900000e+13	

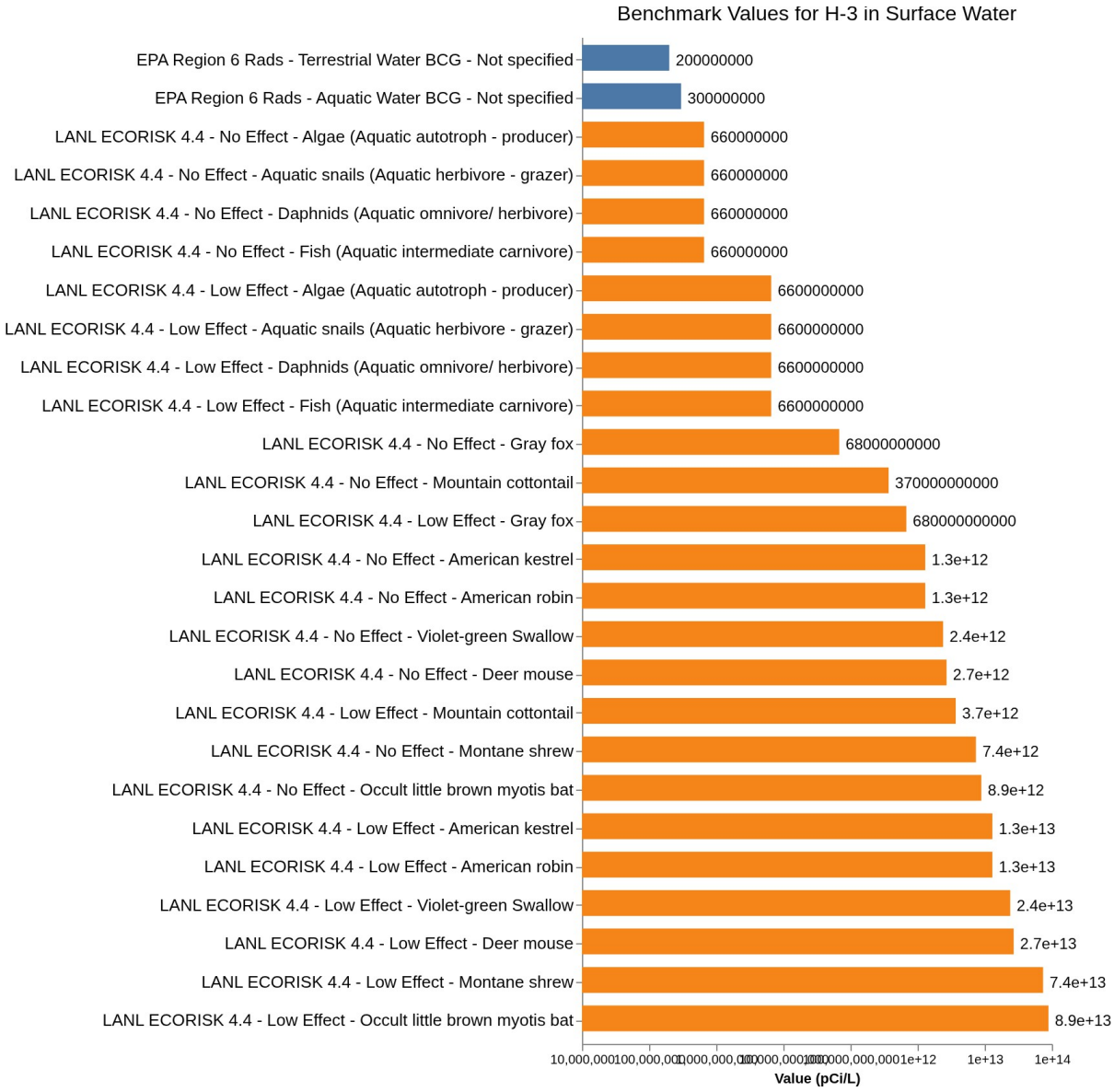


Table 172: Benchmark Values for I−129 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	40000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	6000000.0	

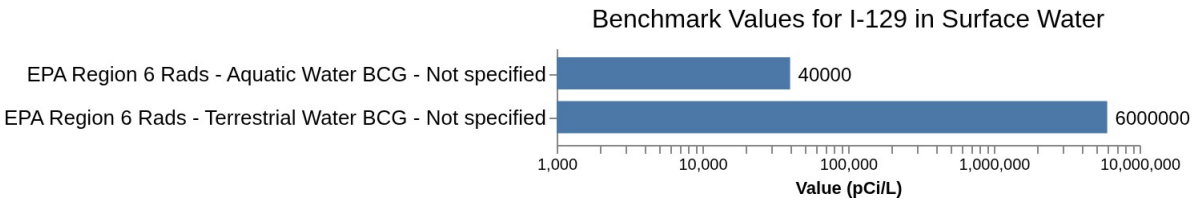


Table 173: Benchmark Values for I−131 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	10000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2000000.0	

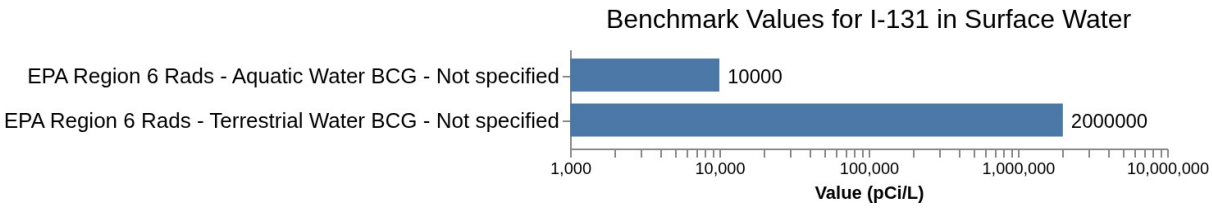


Table 174: Benchmark Values for Na−22 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Fish	1.800000e+07	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.800000e+07	3
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.800000e+07	
LANL ECORISK	Rad Surface Water No Effect	Algae	1.800000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.800000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.800000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.800000e+08	3
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.800000e+08	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	2.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1.300000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	2.400000e+09	
LANL ECORISK	Rad Surface Water No Effect	American robin	4.700000e+09	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	4.800000e+09	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	8.800000e+09	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	9.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	1.300000e+10	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	2.600000e+10	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	3.200000e+10	
LANL ECORISK	Rad Surface Water Low Effect	American robin	4.700000e+10	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	4.800000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	8.800000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	9.900000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	2.600000e+11	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	3.200000e+11	

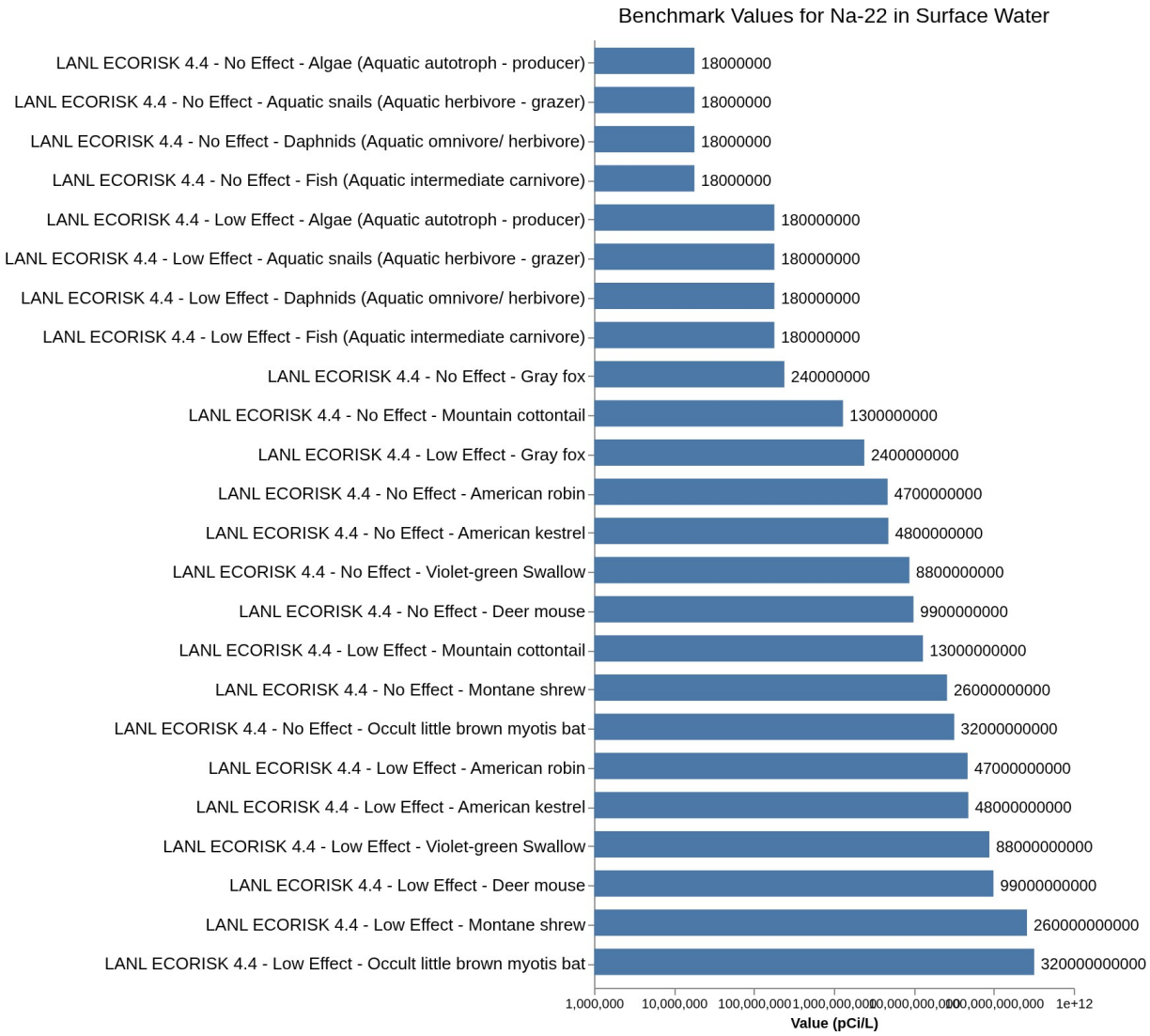

Benchmark Values for Na-22 in Surface Water
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
18000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
18000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
18000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
18000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
180000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
180000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
180000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
180000000
LANL ECORISK 4.4 - No Effect - Gray fox
240000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
1300000000
LANL ECORISK 4.4 - Low Effect - Gray fox
2400000000
LANL ECORISK 4.4 - No Effect - American robin
4700000000
LANL ECORISK 4.4 - No Effect - American kestrel
4800000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
8800000000
LANL ECORISK 4.4 - No Effect - Deer mouse
9900000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
13000000000
LANL ECORISK 4.4 - No Effect - Montane shrew
26000000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
32000000000
LANL ECORISK 4.4 - Low Effect - American robin
47000000000
LANL ECORISK 4.4 - Low Effect - American kestrel
48000000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
88000000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
99000000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
260000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
320000000000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
1e+12
Value (pCi/L)

Table 175: Benchmark Values for Np−237 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Gray fox	3.100000e+05	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	3.100000e+06	
LANL ECORISK	Rad Surface Water No Effect	American robin	4.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	4.100000e+06	
LANL ECORISK	Rad Surface Water No Effect	Fish	7.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	7.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	7.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Algae	7.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.200000e+06	
LANL ECORISK	Rad Surface Water Low Effect	American robin	4.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	4.100000e+07	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	4.700000e+07	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	7.500000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	7.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Fish	7.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	7.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	7.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	4.700000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	7.500000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.600000e+09	

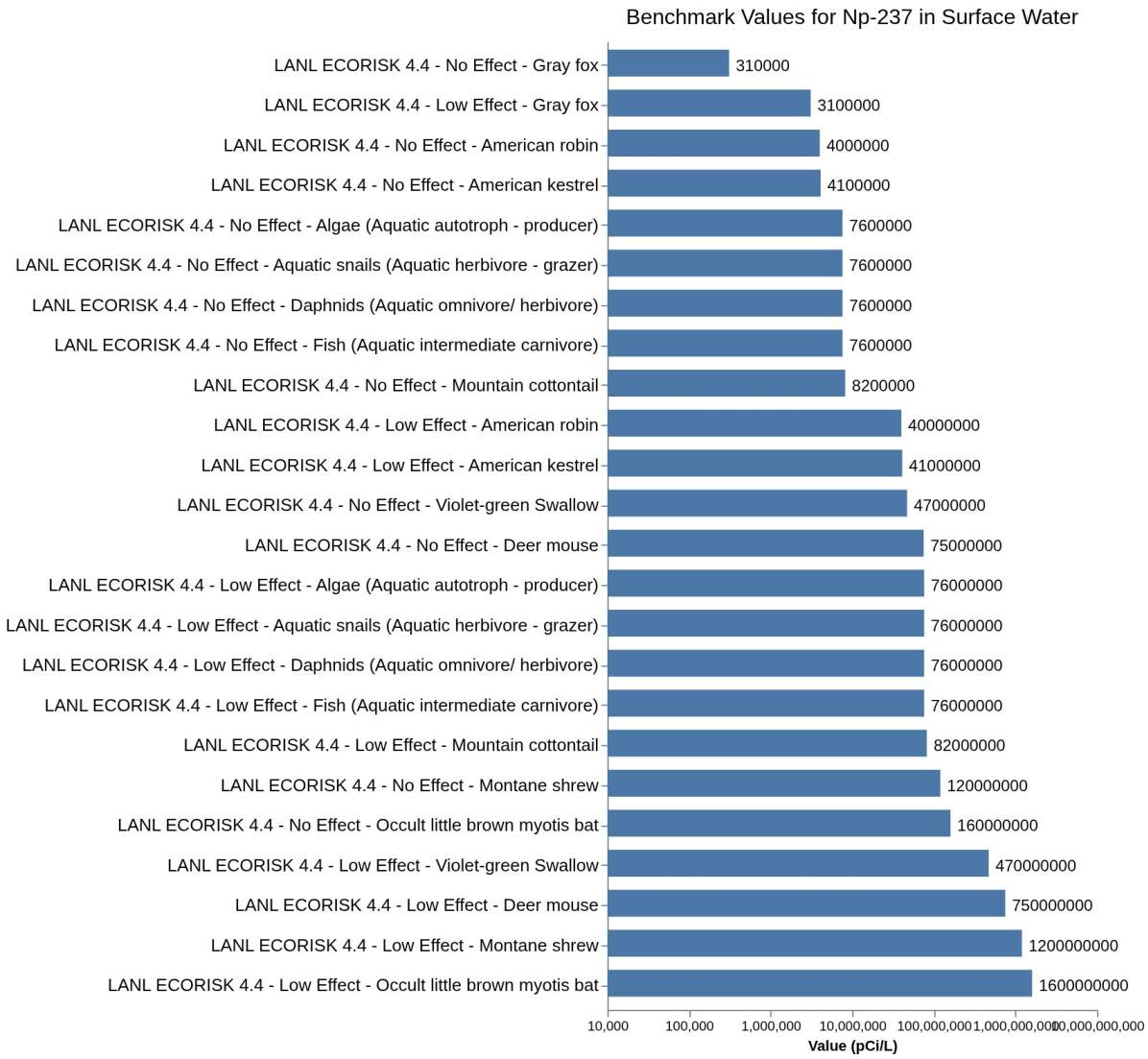

Benchmark Values for Np-237 in Surface Water
LANL ECORISK 4.4 - No Effect - Gray fox
310000
LANL ECORISK 4.4 - Low Effect - Gray fox
3100000
LANL ECORISK 4.4 - No Effect - American robin
4000000
LANL ECORISK 4.4 - No Effect - American kestrel
4100000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
7600000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
7600000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
7600000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
7600000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
8200000
LANL ECORISK 4.4 - Low Effect - American robin
40000000
LANL ECORISK 4.4 - Low Effect - American kestrel
41000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
47000000
LANL ECORISK 4.4 - No Effect - Deer mouse
75000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
76000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
76000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
76000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
76000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
82000000
LANL ECORISK 4.4 - No Effect - Montane shrew
120000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
160000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
470000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
750000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
1200000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
1600000000
10,000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
Value (pCi/L)

Table 176: Benchmark Values for Pb−210 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	9.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	9.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	9.000000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	9.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.700000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	9.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	9.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	9.000000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	9.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	2.800000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	1.700000e+09	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	3.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	4.600000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	6.100000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	1.700000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	2.700000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	4.600000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	6.100000e+10	

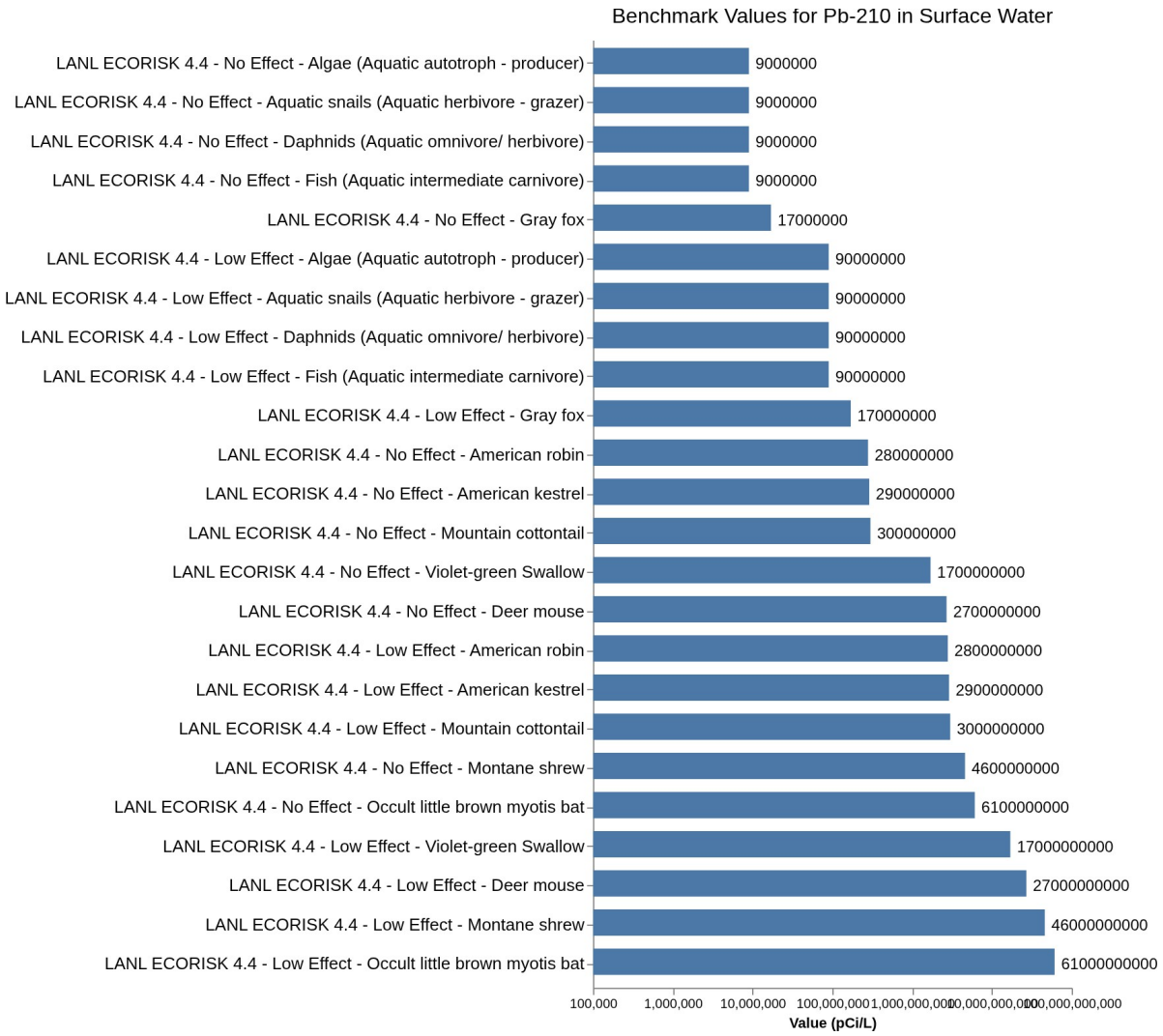

Benchmark Values for Pb-210 in Surface Water
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
9000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
9000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
9000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
9000000
LANL ECORISK 4.4 - No Effect - Gray fox
17000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
90000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
90000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
90000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
90000000
LANL ECORISK 4.4 - Low Effect - Gray fox
170000000
LANL ECORISK 4.4 - No Effect - American robin
280000000
LANL ECORISK 4.4 - No Effect - American kestrel
290000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
300000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
1700000000
LANL ECORISK 4.4 - No Effect - Deer mouse
2700000000
LANL ECORISK 4.4 - Low Effect - American robin
2800000000
LANL ECORISK 4.4 - Low Effect - American kestrel
2900000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
3000000000
LANL ECORISK 4.4 - No Effect - Montane shrew
4600000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
6100000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
17000000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
27000000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
46000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
61000000000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 177: Benchmark Values for Pu−238 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Gray fox	2.800000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	2.800000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	3.700000e+07	
LANL ECORISK	Rad Surface Water No Effect	American robin	3.700000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	7.300000e+07	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	3.700000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American robin	3.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	4.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	4.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	4.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Fish	4.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	4.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	7.300000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	4.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	4.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	4.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Fish	4.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	4.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.000000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.400000e+10	

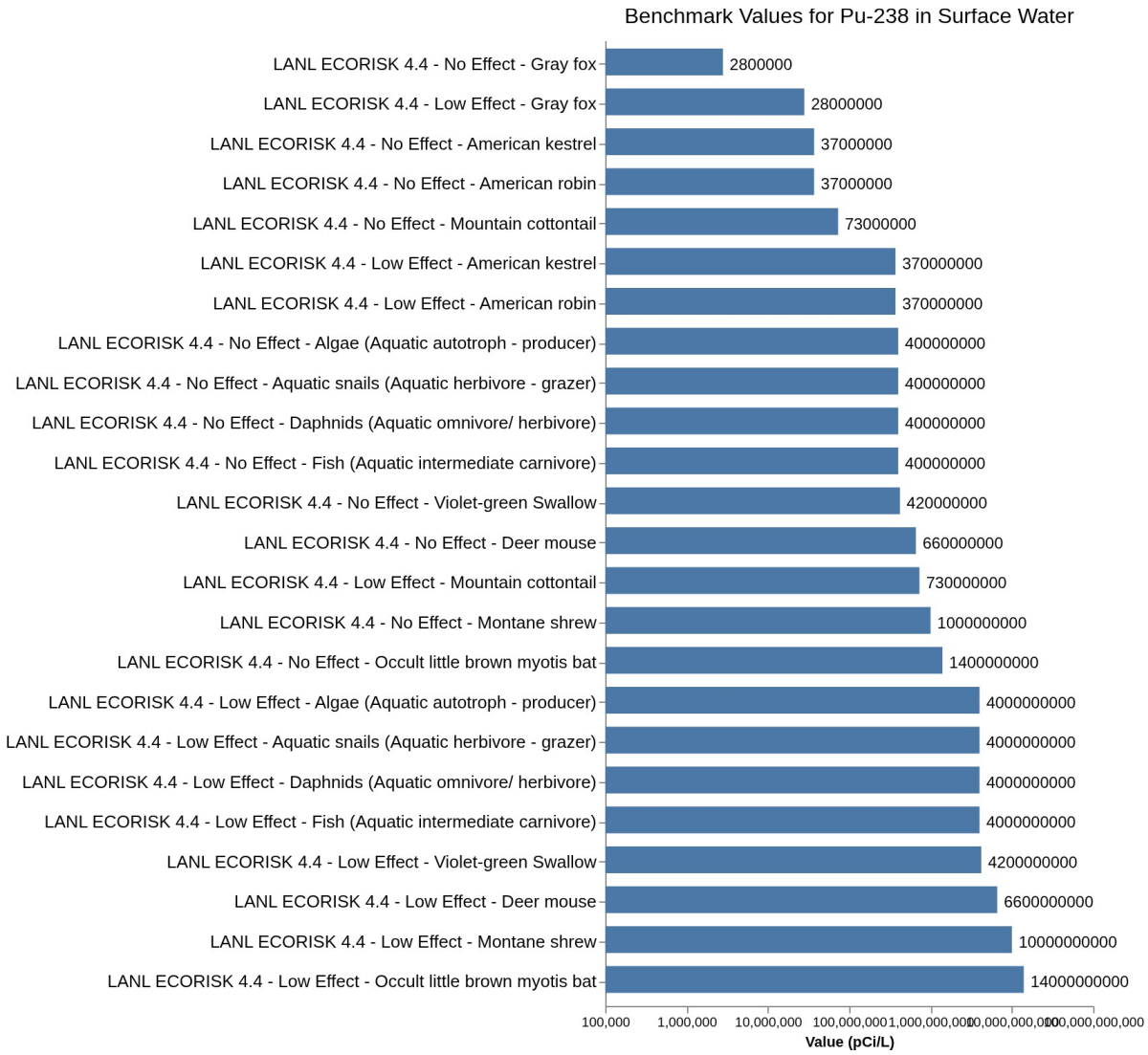

Benchmark Values for Pu-238 in Surface Water
LANL ECORISK 4.4 - No Effect - Gray fox
2800000
LANL ECORISK 4.4 - Low Effect - Gray fox
28000000
LANL ECORISK 4.4 - No Effect - American kestrel
37000000
LANL ECORISK 4.4 - No Effect - American robin
37000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
73000000
LANL ECORISK 4.4 - Low Effect - American kestrel
370000000
LANL ECORISK 4.4 - Low Effect - American robin
370000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
400000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
400000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
400000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
400000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
420000000
LANL ECORISK 4.4 - No Effect - Deer mouse
660000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
730000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1000000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1400000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
4000000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
4000000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
4000000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
4000000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
4200000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
6600000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
10000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
14000000000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 178: Benchmark Values for Pu−239 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	2.900000e+06	4
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	2.900000e+07	4
LANL ECORISK	Rad Surface Water No Effect	American robin	3.700000e+07	4
LANL ECORISK	Rad Surface Water No Effect	American kestrel	3.800000e+07	4
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	7.700000e+07	4
LANL ECORISK	Rad Surface Water Low Effect	American robin	3.700000e+08	4
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	3.800000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	4.400000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	7.000000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	7.100000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Daphnids	7.100000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Fish	7.100000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Algae	7.100000e+08	4
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	7.700000e+08	4
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.100000e+09	4
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.500000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	4.400000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	7.000000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Algae	7.100000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	7.100000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	7.100000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Fish	7.100000e+09	4
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.100000e+10	4
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.500000e+10	4

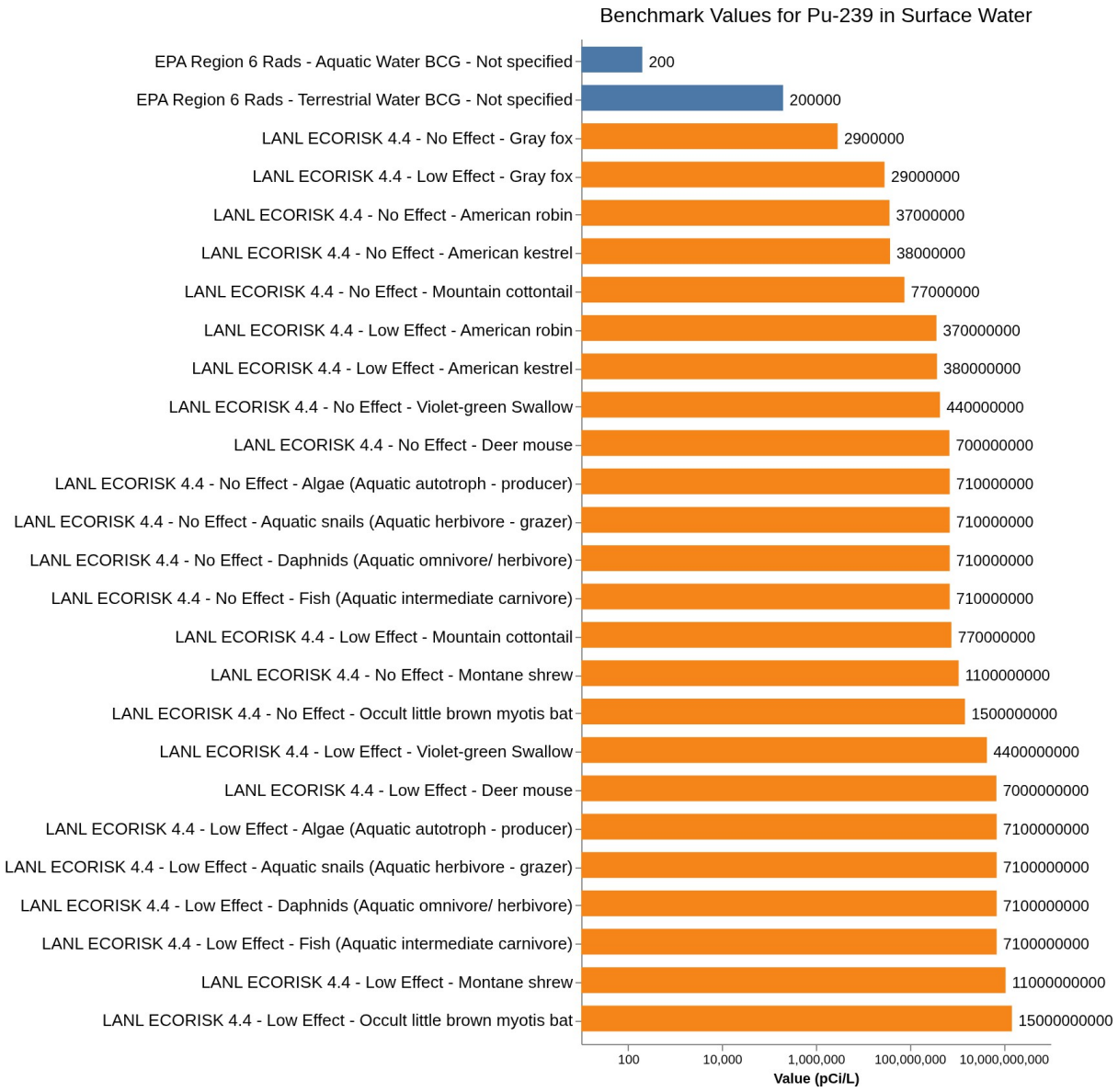

Benchmark Values for Pu-239 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
200
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
200000
LANL ECORISK 4.4 - No Effect - Gray fox
2900000
LANL ECORISK 4.4 - Low Effect - Gray fox
29000000
LANL ECORISK 4.4 - No Effect - American robin
37000000
LANL ECORISK 4.4 - No Effect - American kestrel
38000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
77000000
LANL ECORISK 4.4 - Low Effect - American robin
370000000
LANL ECORISK 4.4 - Low Effect - American kestrel
380000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
440000000
LANL ECORISK 4.4 - No Effect - Deer mouse
700000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
710000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
710000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
710000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
710000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
770000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1100000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1500000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
4400000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
7000000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
7100000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
7100000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
7100000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
7100000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
11000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
15000000000
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 179: Benchmark Values for Pu−241 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	7.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	7.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	7.600000e+08	3
LANL ECORISK	Rad Surface Water No Effect	Fish	7.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	6.300000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	7.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	7.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	7.600000e+09	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	7.600000e+09	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	3.500000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	6.300000e+10	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1.200000e+11	
LANL ECORISK	Rad Surface Water No Effect	American robin	1.200000e+11	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	2.200000e+11	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	2.500000e+11	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	3.500000e+11	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	6.900000e+11	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	8.300000e+11	
LANL ECORISK	Rad Surface Water Low Effect	American robin	1.200000e+12	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	1.200000e+12	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	2.200000e+12	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	2.500000e+12	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	6.900000e+12	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	8.300000e+12	

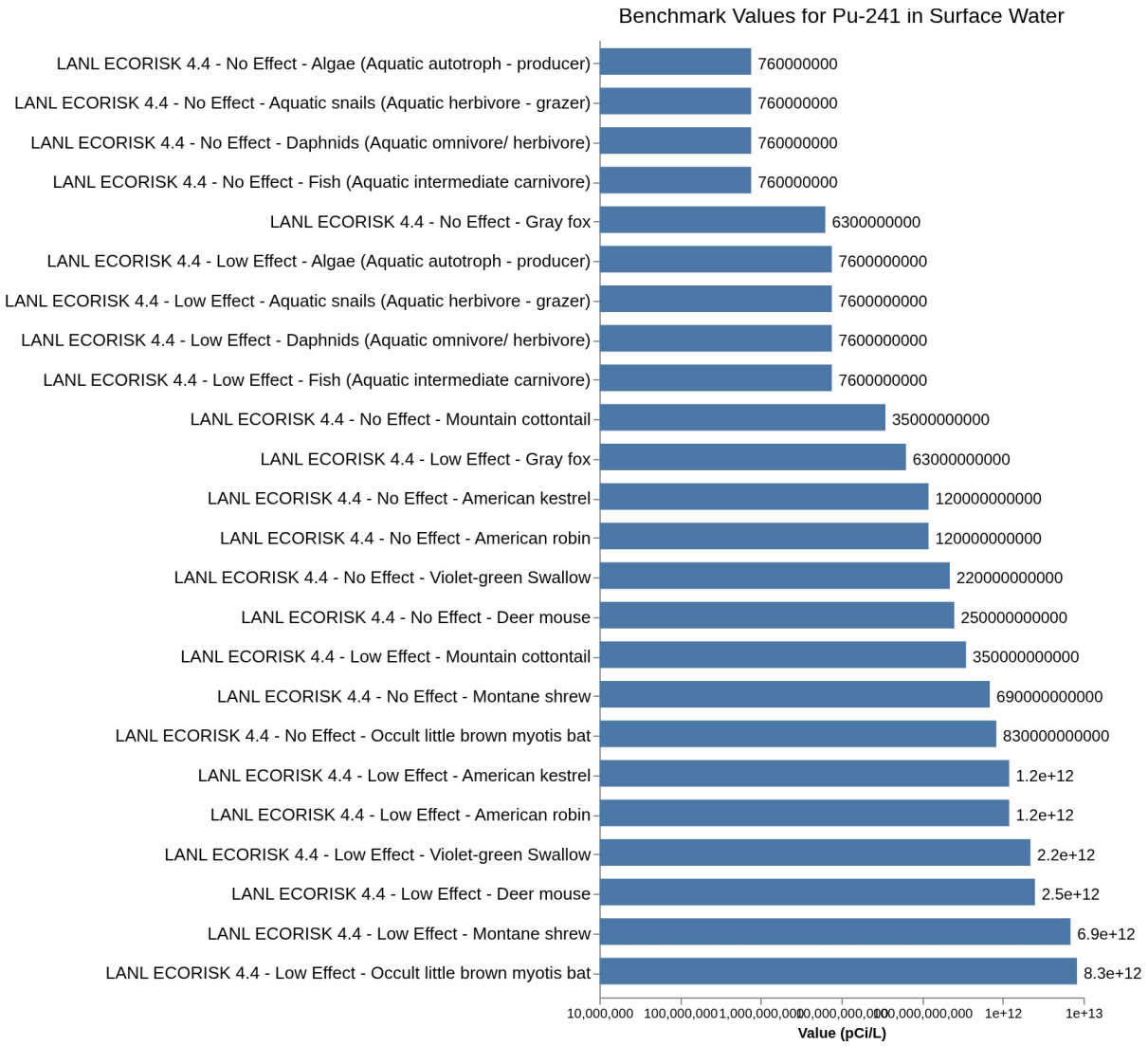

Benchmark Values for Pu-241 in Surface Water
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
760000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
760000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
760000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
760000000
LANL ECORISK 4.4 - No Effect - Gray fox
6300000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
7600000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
7600000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
7600000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
7600000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
35000000000
LANL ECORISK 4.4 - Low Effect - Gray fox
63000000000
LANL ECORISK 4.4 - No Effect - American kestrel
120000000000
LANL ECORISK 4.4 - No Effect - American robin
120000000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
220000000000
LANL ECORISK 4.4 - No Effect - Deer mouse
250000000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
350000000000
LANL ECORISK 4.4 - No Effect - Montane shrew
690000000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
830000000000
LANL ECORISK 4.4 - Low Effect - American kestrel
1.2e+12
LANL ECORISK 4.4 - Low Effect - American robin
1.2e+12
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
2.2e+12
LANL ECORISK 4.4 - Low Effect - Deer mouse
2.5e+12
LANL ECORISK 4.4 - Low Effect - Montane shrew
6.9e+12
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
8.3e+12
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
1e+12
1e+13
Value (pCi/L)

Table 180: Benchmark Values for Ra−226 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	4.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	8000.0	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	55000.0	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	550000.0	
LANL ECORISK	Rad Surface Water No Effect	American robin	740000.0	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	760000.0	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1300000.0	
LANL ECORISK	Rad Surface Water No Effect	Algae	1400000.0	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1400000.0	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1400000.0	
LANL ECORISK	Rad Surface Water No Effect	Fish	1400000.0	
LANL ECORISK	Rad Surface Water Low Effect	American robin	7400000.0	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	7600000.0	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	7900000.0	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	12000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	13000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Algae	14000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	14000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	14000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Fish	14000000.0	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	20000000.0	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	27000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	79000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	120000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	200000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	270000000.0	

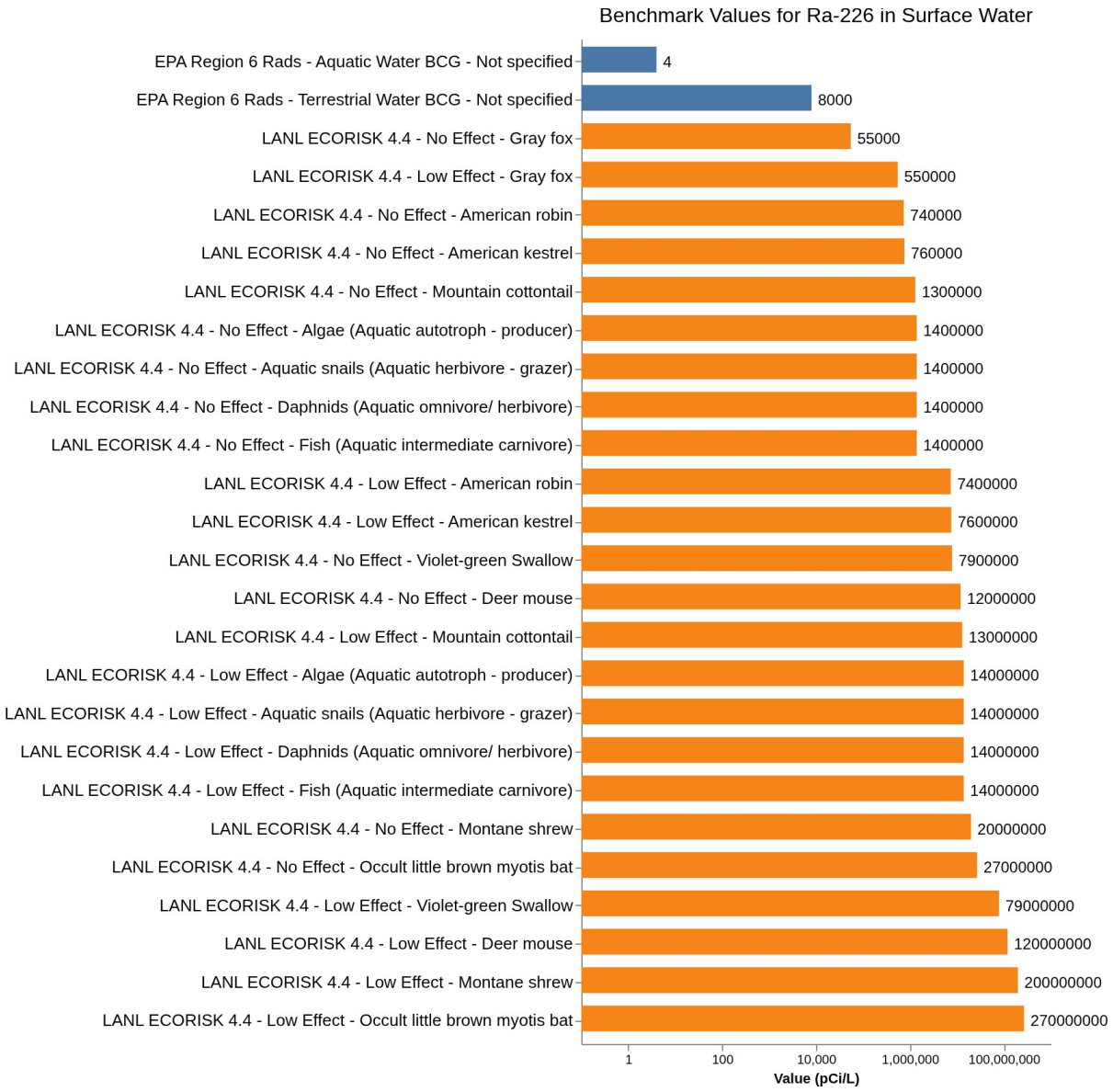

Benchmark Values for Ra-226 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
4
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
8000
LANL ECORISK 4.4 - No Effect - Gray fox
55000
LANL ECORISK 4.4 - Low Effect - Gray fox
550000
LANL ECORISK 4.4 - No Effect - American robin
740000
LANL ECORISK 4.4 - No Effect - American kestrel
760000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
1300000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
1400000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
1400000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
1400000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
1400000
LANL ECORISK 4.4 - Low Effect - American robin
7400000
LANL ECORISK 4.4 - Low Effect - American kestrel
7600000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
7900000
LANL ECORISK 4.4 - No Effect - Deer mouse
12000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
13000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
14000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
14000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
14000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
14000000
LANL ECORISK 4.4 - No Effect - Montane shrew
20000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
27000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
79000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
120000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
200000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
270000000
1
100
10,000
1,000,000
100,000,000
Value (pCi/L)

Table 181: Benchmark Values for Ra−228 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	3.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	7000.0	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	64000.0	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	640000.0	
LANL ECORISK	Rad Surface Water No Effect	American robin	990000.0	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1000000.0	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1200000.0	
LANL ECORISK	Rad Surface Water No Effect	Algae	2800000.0	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	2800000.0	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	2800000.0	
LANL ECORISK	Rad Surface Water No Effect	Fish	2800000.0	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	7200000.0	
LANL ECORISK	Rad Surface Water Low Effect	American robin	9900000.0	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	10000000.0	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	11000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	12000000.0	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	18000000.0	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	24000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Algae	28000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	28000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	28000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Fish	28000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	72000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	110000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	180000000.0	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	240000000.0	

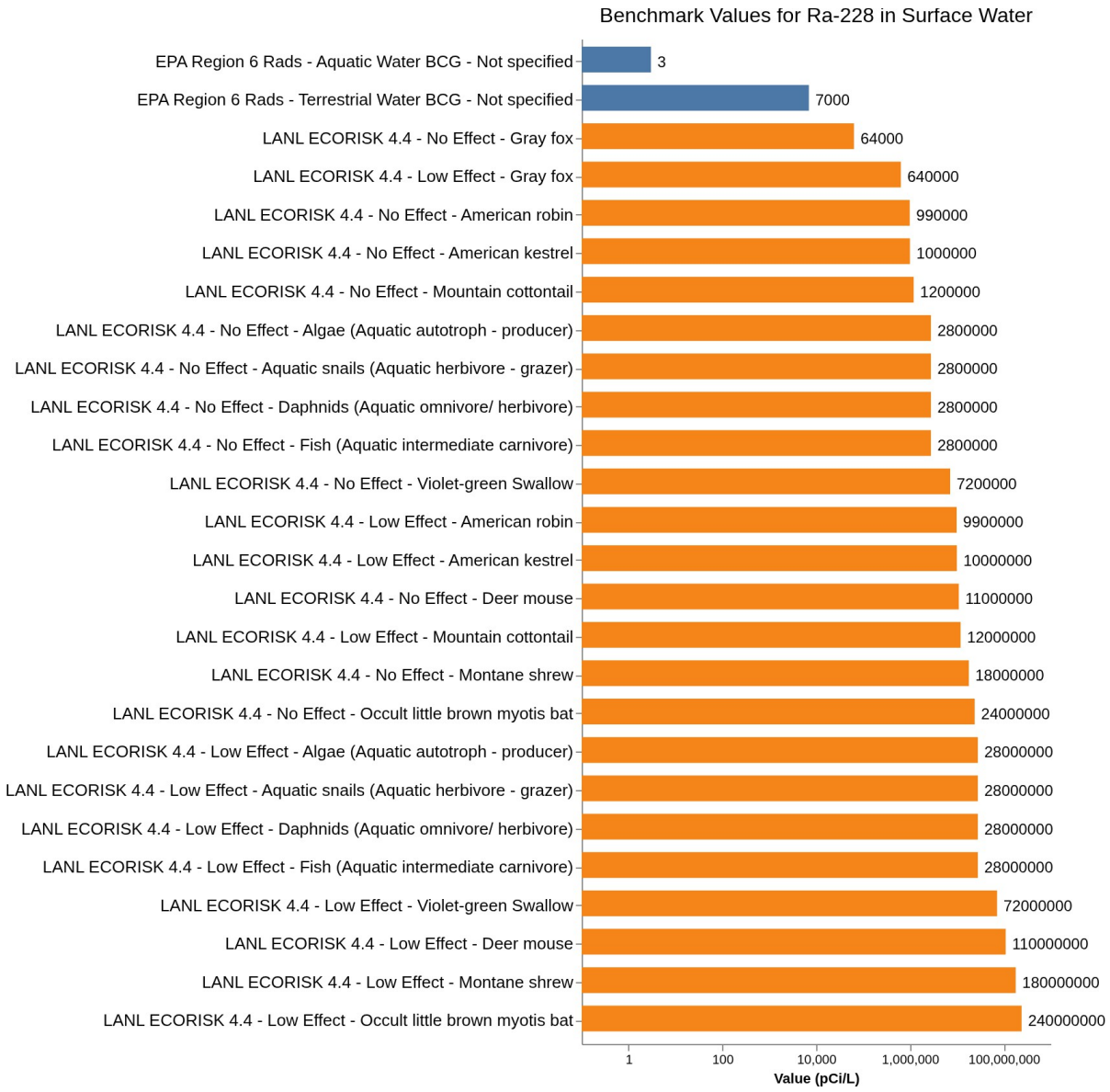

Benchmark Values for Ra-228 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
3
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
7000
LANL ECORISK 4.4 - No Effect - Gray fox
64000
LANL ECORISK 4.4 - Low Effect - Gray fox
640000
LANL ECORISK 4.4 - No Effect - American robin
990000
LANL ECORISK 4.4 - No Effect - American kestrel
1000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
1200000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
2800000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
2800000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
2800000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
2800000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
7200000
LANL ECORISK 4.4 - Low Effect - American robin
9900000
LANL ECORISK 4.4 - Low Effect - American kestrel
10000000
LANL ECORISK 4.4 - No Effect - Deer mouse
11000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
12000000
LANL ECORISK 4.4 - No Effect - Montane shrew
18000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
24000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
28000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
28000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
28000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
28000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
72000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
110000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
180000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
240000000
1
100
10,000
1,000,000
100,000,000
Value (pCi/L)

Table 182: Benchmark Values for Sb−125 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	400000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	7000000.0	

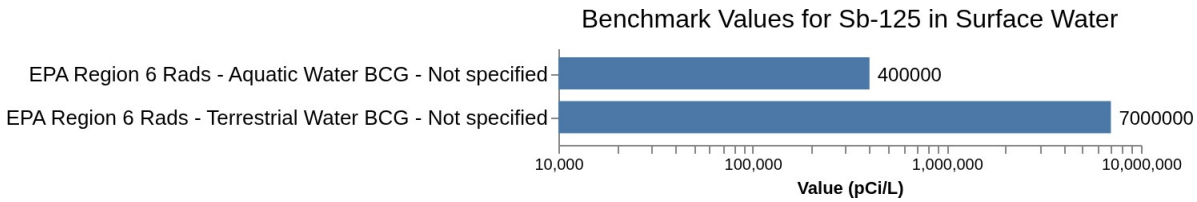


Table 183: Benchmark Values for Sr−90 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	3.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	5.000000e+04	
LANL ECORISK	Rad Surface Water No Effect	Algae	3.400000e+06	2
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	3.400000e+06	2
LANL ECORISK	Rad Surface Water No Effect	Daphnids	3.400000e+06	2, 3
LANL ECORISK	Rad Surface Water No Effect	Fish	3.400000e+06	2
LANL ECORISK	Rad Surface Water No Effect	Gray fox	3.800000e+06	2
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	3.400000e+07	2, 3
LANL ECORISK	Rad Surface Water Low Effect	Fish	3.400000e+07	2
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	3.400000e+07	2
LANL ECORISK	Rad Surface Water Low Effect	Algae	3.400000e+07	2
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	3.800000e+07	2
LANL ECORISK	Rad Surface Water No Effect	American robin	5.100000e+07	2
LANL ECORISK	Rad Surface Water No Effect	American kestrel	5.200000e+07	2
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	9.200000e+07	2
LANL ECORISK	Rad Surface Water Low Effect	American robin	5.100000e+08	2
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	5.200000e+08	2
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.300000e+08	2
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	8.300000e+08	2
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	9.200000e+08	2
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.300000e+09	2
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.800000e+09	2
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.300000e+09	2
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	8.300000e+09	2
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.300000e+10	2
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.800000e+10	2

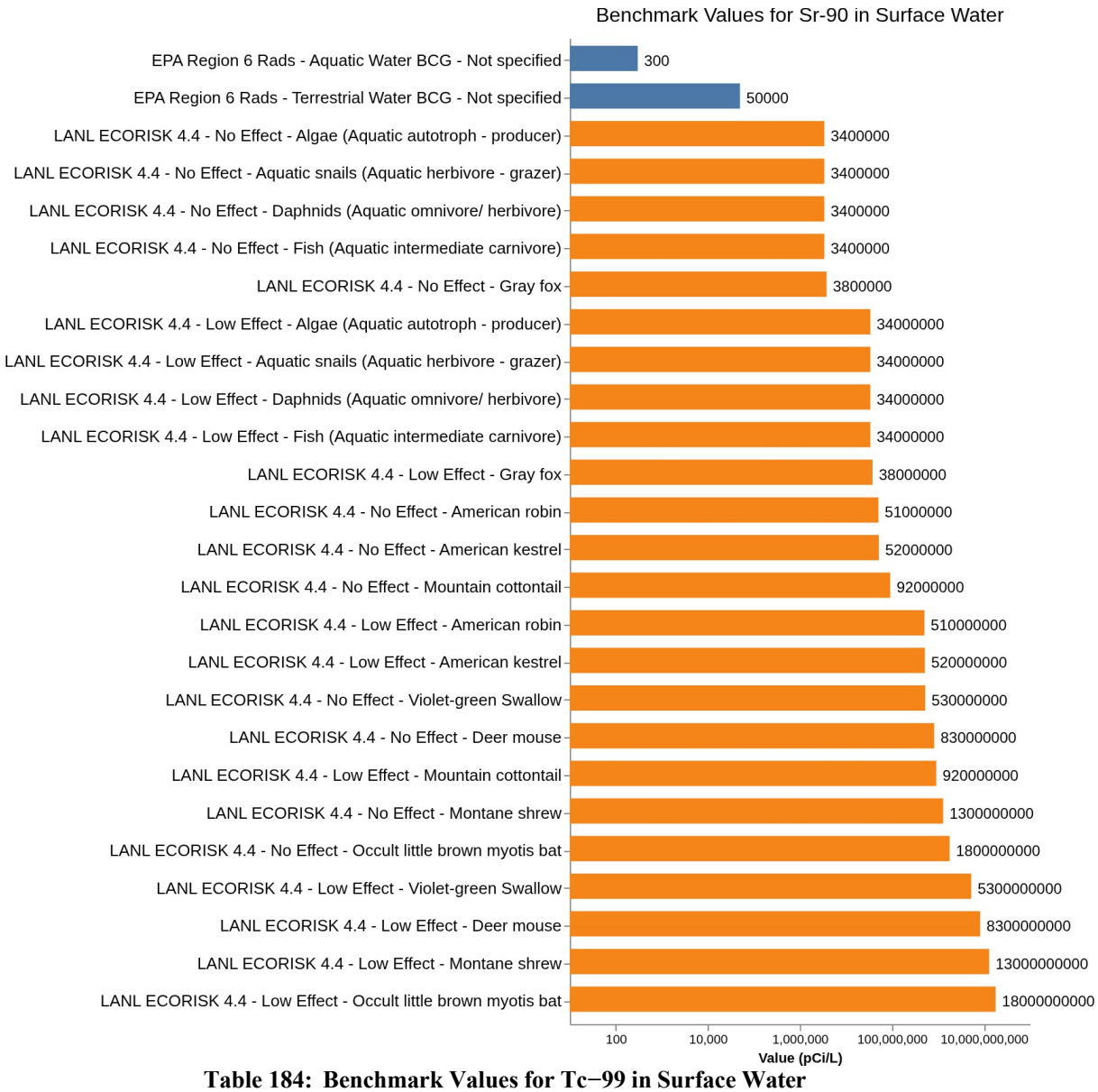


Table 184: Benchmark Values for Tc−99 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	700000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	20000000.0	

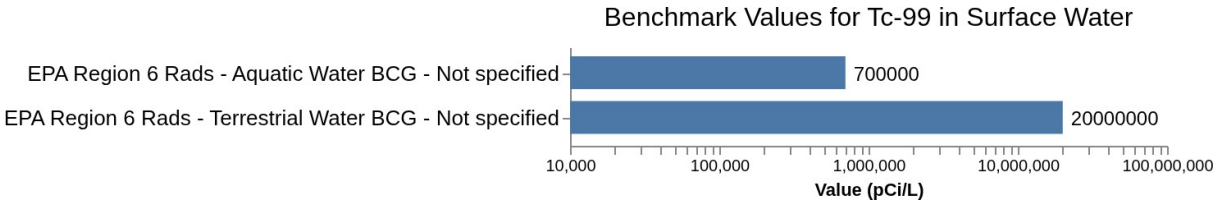


Table 185: Benchmark Values for Th−228 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	1.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.600000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	1.600000e+06	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	6.800000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.600000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	6.800000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	9.100000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	1.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	1.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	8.000000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	9.100000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American robin	1.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	1.200000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.400000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	8.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.400000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.800000e+10	

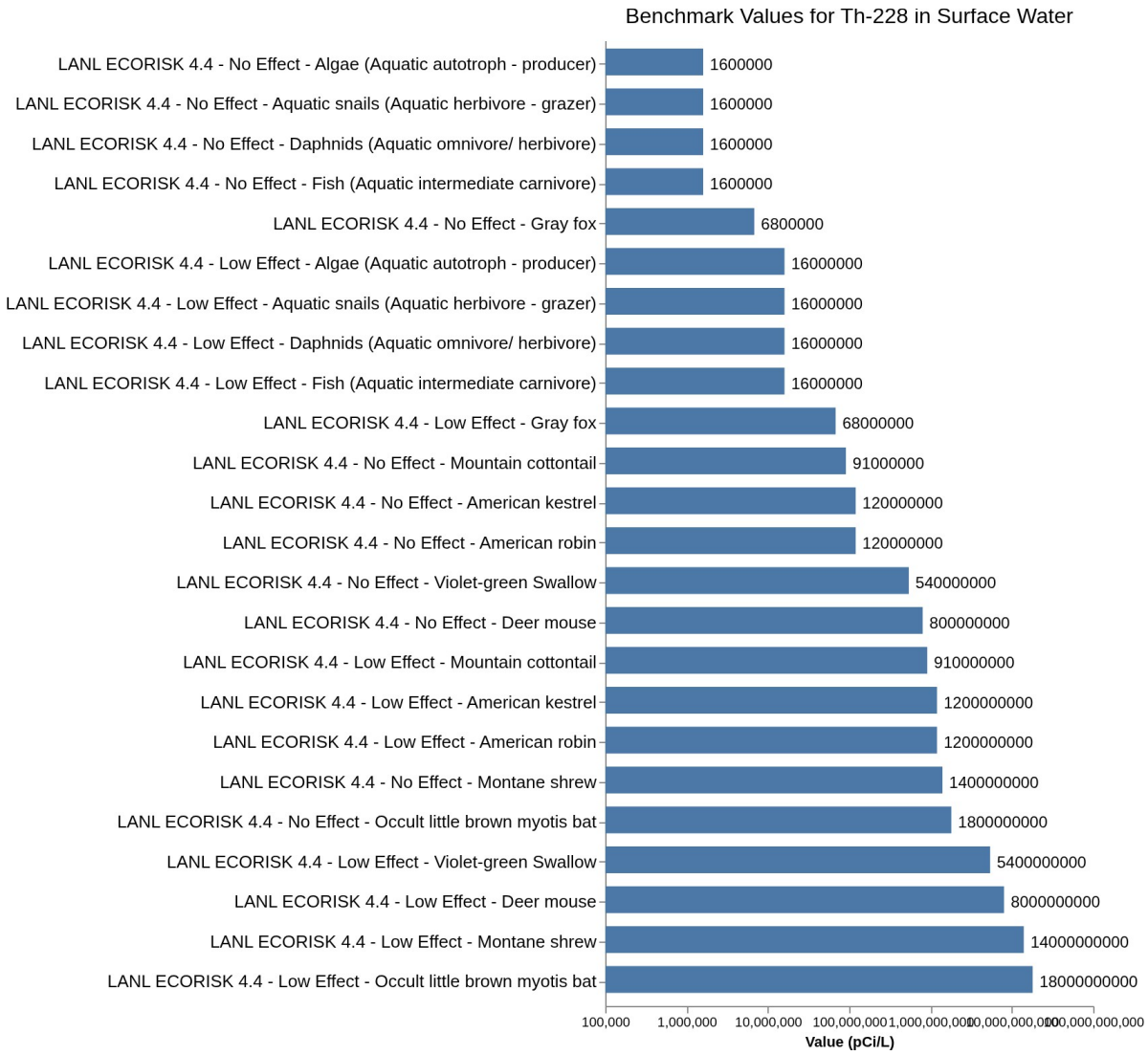

Benchmark Values for Th-228 in Surface Water
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
1600000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
1600000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
1600000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
1600000
LANL ECORISK 4.4 - No Effect - Gray fox
6800000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
16000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
16000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
16000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
16000000
LANL ECORISK 4.4 - Low Effect - Gray fox
68000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
91000000
LANL ECORISK 4.4 - No Effect - American kestrel
120000000
LANL ECORISK 4.4 - No Effect - American robin
120000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
540000000
LANL ECORISK 4.4 - No Effect - Deer mouse
800000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
910000000
LANL ECORISK 4.4 - Low Effect - American kestrel
1200000000
LANL ECORISK 4.4 - Low Effect - American robin
1200000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1400000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1800000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
5400000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
8000000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
14000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
18000000000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 186: Benchmark Values for Th−229 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Gray fox	3.000000e+06	
LANL ECORISK	Rad Surface Water No Effect	Algae	3.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	3.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	3.200000e+06	
LANL ECORISK	Rad Surface Water No Effect	Fish	3.200000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	3.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	3.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	3.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	3.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Fish	3.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	3.900000e+07	
LANL ECORISK	Rad Surface Water No Effect	American robin	3.900000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	7.900000e+07	
LANL ECORISK	Rad Surface Water Low Effect	American robin	3.900000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	3.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	4.500000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	7.200000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	7.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.100000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.500000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	4.500000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	7.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.100000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.500000e+10	

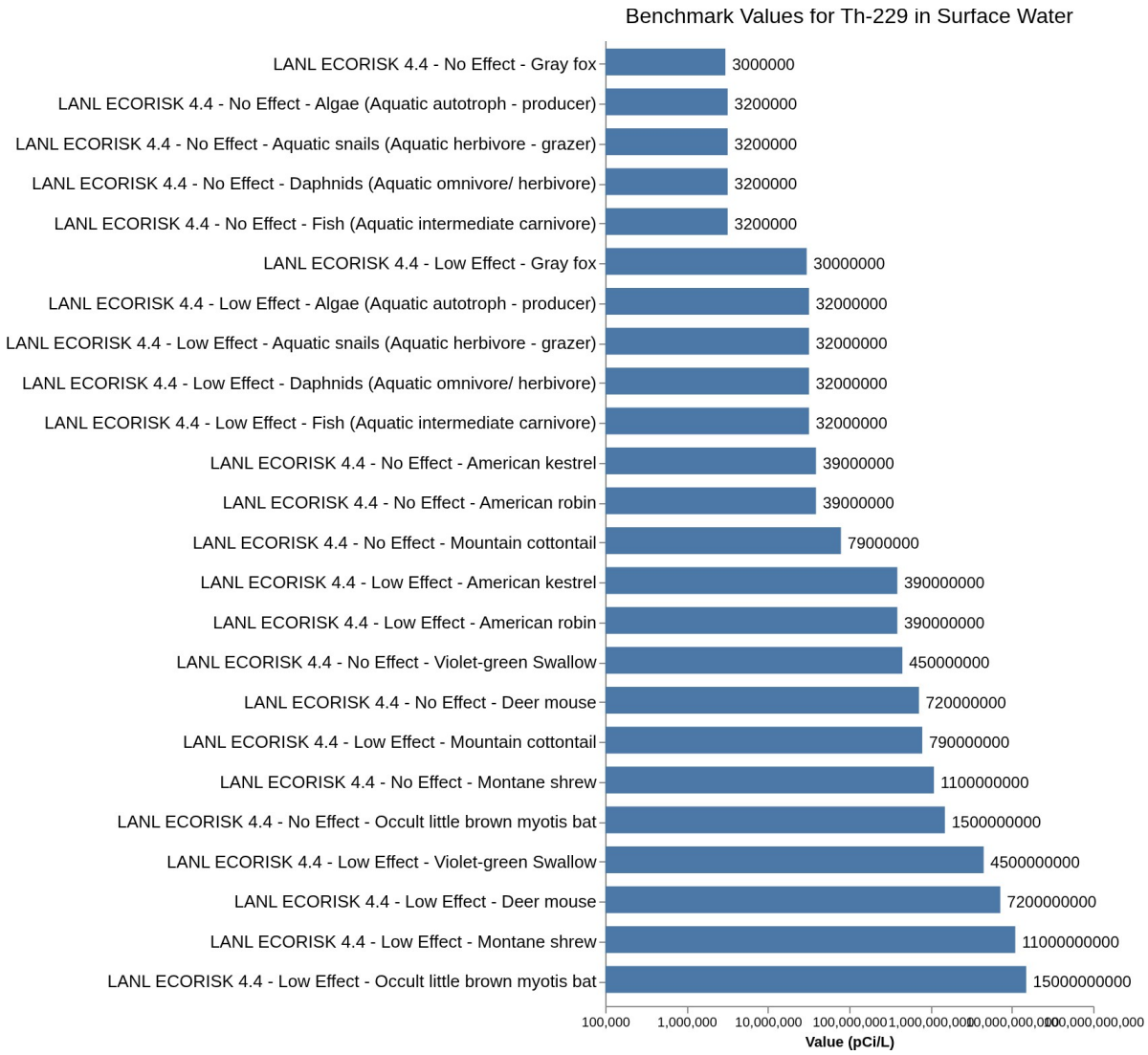

Benchmark Values for Th-229 in Surface Water
LANL ECORISK 4.4 - No Effect - Gray fox
3000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
3200000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
3200000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
3200000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
3200000
LANL ECORISK 4.4 - Low Effect - Gray fox
30000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
32000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
32000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
32000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
32000000
LANL ECORISK 4.4 - No Effect - American kestrel
39000000
LANL ECORISK 4.4 - No Effect - American robin
39000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
79000000
LANL ECORISK 4.4 - Low Effect - American kestrel
390000000
LANL ECORISK 4.4 - Low Effect - American robin
390000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
450000000
LANL ECORISK 4.4 - No Effect - Deer mouse
720000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
790000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1100000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1500000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
4500000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
7200000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
11000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
15000000000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 187: Benchmark Values for Th−230 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Gray fox	3.200000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	3.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	American robin	4.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	4.200000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.500000e+07	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Fish	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	2.700000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	4.200000e+08	
LANL ECORISK	Rad Surface Water Low Effect	American robin	4.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	4.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	7.800000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.500000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.200000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Fish	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	4.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	7.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.200000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.600000e+10	

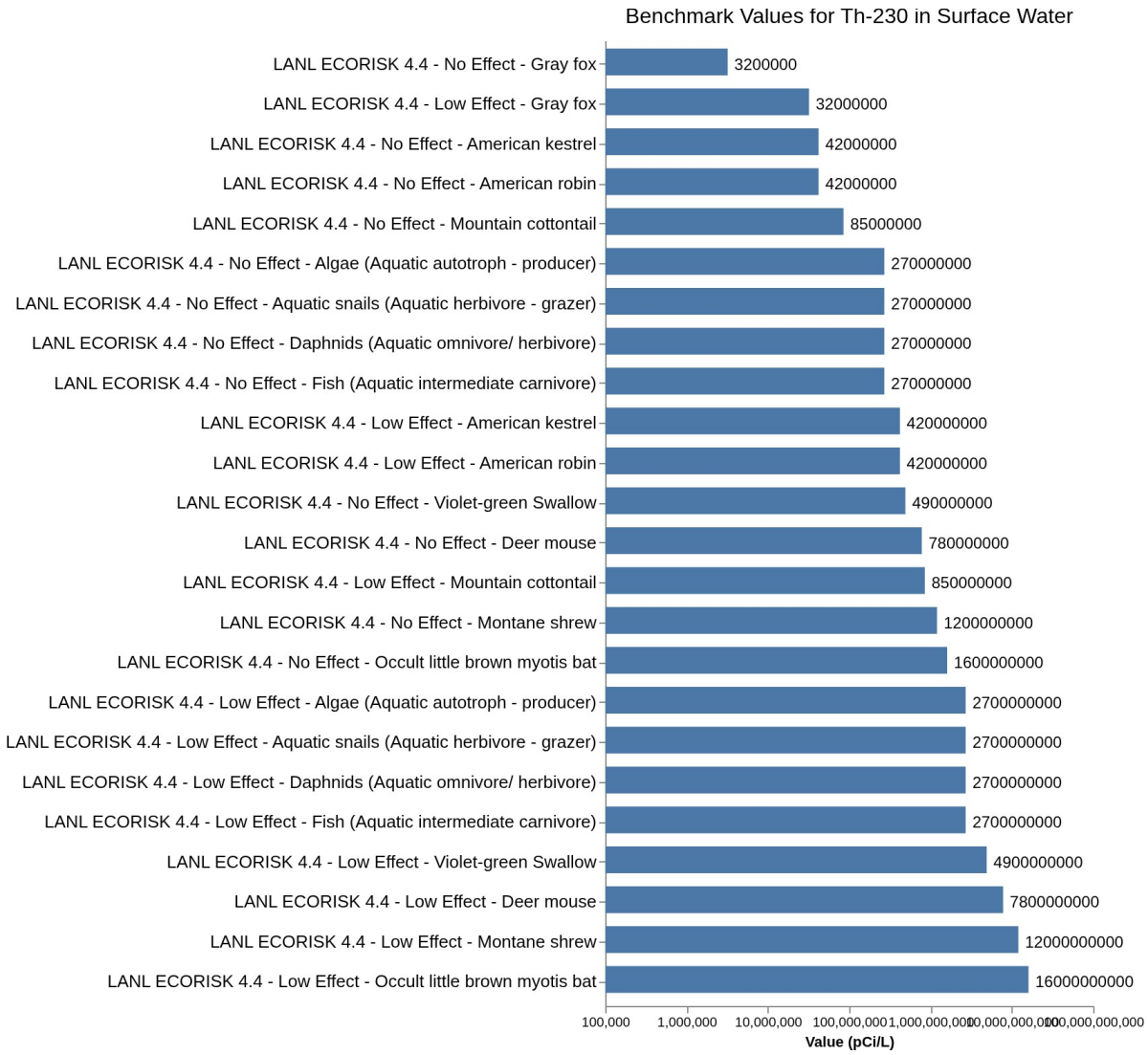

Benchmark Values for Th-230 in Surface Water
LANL ECORISK 4.4 - No Effect - Gray fox
3200000
LANL ECORISK 4.4 - Low Effect - Gray fox
32000000
LANL ECORISK 4.4 - No Effect - American kestrel
42000000
LANL ECORISK 4.4 - No Effect - American robin
42000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
85000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
270000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
270000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
270000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
270000000
LANL ECORISK 4.4 - Low Effect - American kestrel
420000000
LANL ECORISK 4.4 - Low Effect - American robin
420000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
490000000
LANL ECORISK 4.4 - No Effect - Deer mouse
780000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
850000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1200000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1600000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
2700000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
2700000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
2700000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
2700000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
4900000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
7800000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
12000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
16000000000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 188: Benchmark Values for Th−232 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	3.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	5.000000e+04	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	3.800000e+05	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	3.800000e+06	
LANL ECORISK	Rad Surface Water No Effect	American robin	4.900000e+06	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	5.100000e+06	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	1.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	American robin	4.900000e+07	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	5.100000e+07	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.800000e+07	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	9.200000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	1.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	3.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	3.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	3.200000e+08	
LANL ECORISK	Rad Surface Water No Effect	Fish	3.200000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.800000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	9.200000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.400000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	3.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	3.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Fish	3.200000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	3.200000e+09	

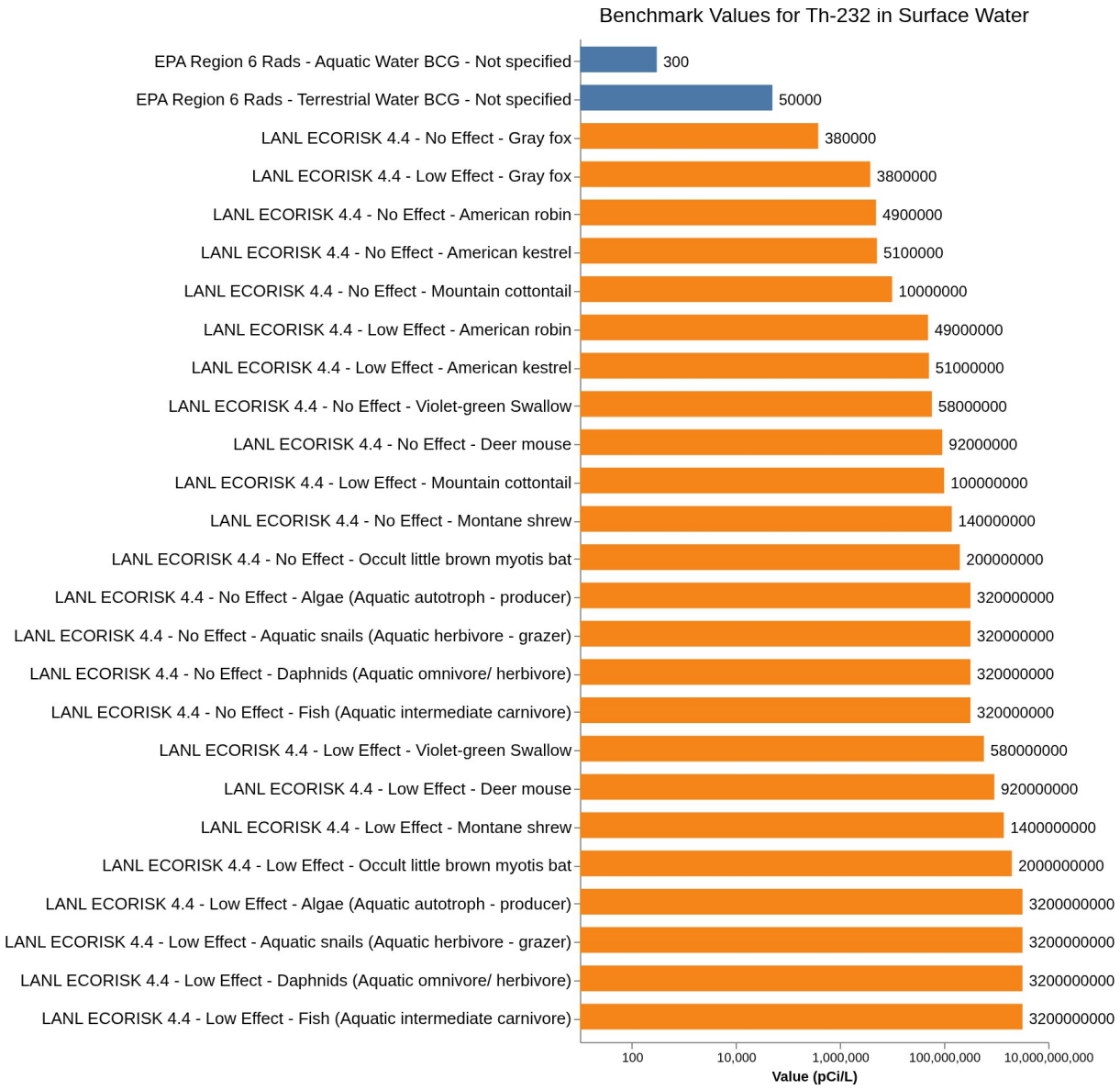

Benchmark Values for Th-232 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
300
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
50000
LANL ECORISK 4.4 - No Effect - Gray fox
380000
LANL ECORISK 4.4 - Low Effect - Gray fox
3800000
LANL ECORISK 4.4 - No Effect - American robin
4900000
LANL ECORISK 4.4 - No Effect - American kestrel
5100000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
10000000
LANL ECORISK 4.4 - Low Effect - American robin
49000000
LANL ECORISK 4.4 - Low Effect - American kestrel
51000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
58000000
LANL ECORISK 4.4 - No Effect - Deer mouse
92000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
100000000
LANL ECORISK 4.4 - No Effect - Montane shrew
140000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
200000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
320000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
320000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
320000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
320000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
580000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
920000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
1400000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
2000000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
3200000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
3200000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
3200000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
3200000000
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 189: Benchmark Values for U−233 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	4.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.300000e+07	3
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.300000e+08	3
LANL ECORISK	Rad Surface Water No Effect	American robin	2.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.100000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.100000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	1.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Fish	1.000000e+09	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.500000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.100000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.100000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.000000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.000000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.000000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.000000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.500000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.800000e+10	

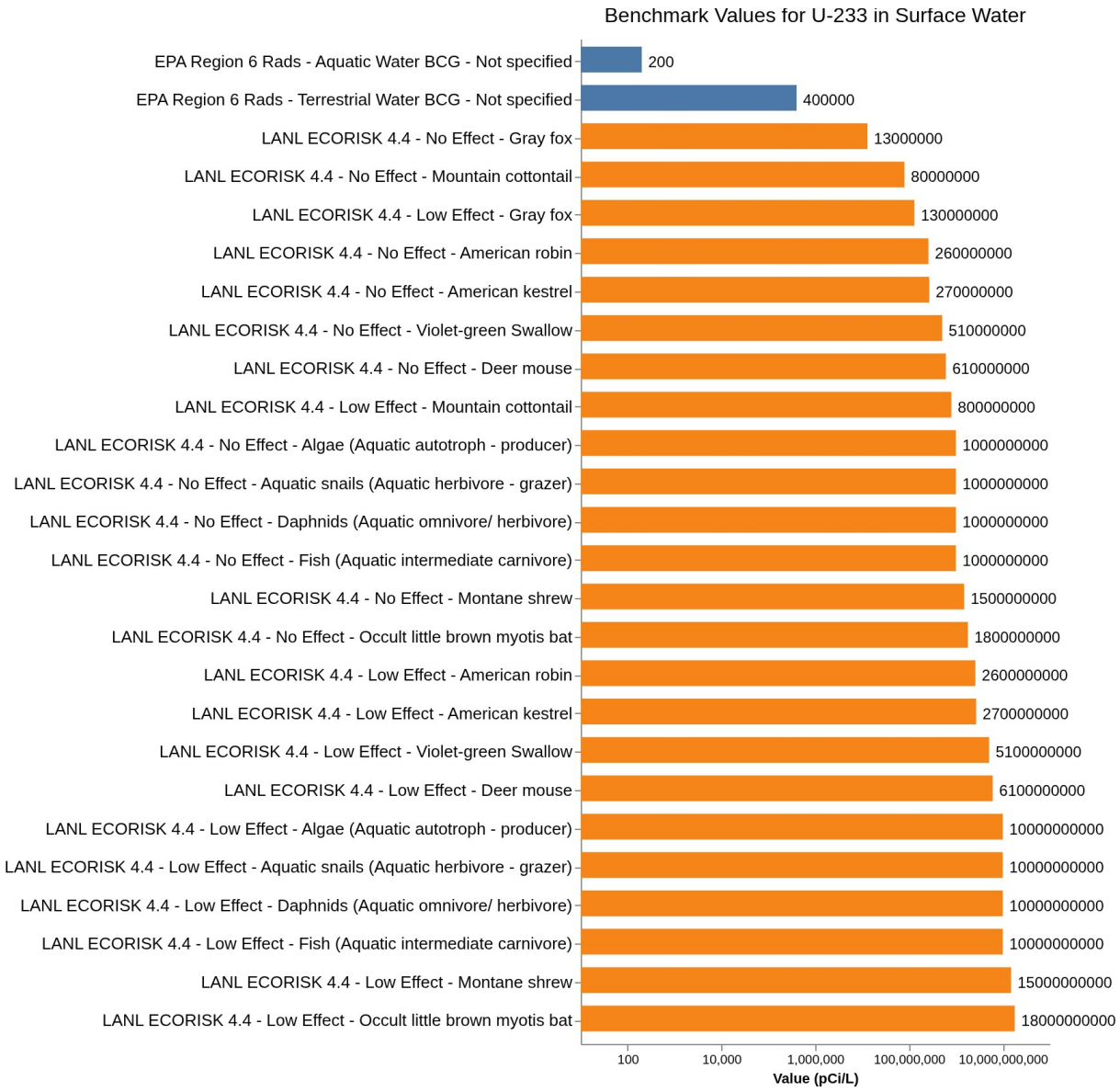

Benchmark Values for U-233 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
200
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
400000
LANL ECORISK 4.4 - No Effect - Gray fox
13000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
80000000
LANL ECORISK 4.4 - Low Effect - Gray fox
130000000
LANL ECORISK 4.4 - No Effect - American robin
260000000
LANL ECORISK 4.4 - No Effect - American kestrel
270000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
510000000
LANL ECORISK 4.4 - No Effect - Deer mouse
610000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
800000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
1000000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
1000000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
1000000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
1000000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1500000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1800000000
LANL ECORISK 4.4 - Low Effect - American robin
2600000000
LANL ECORISK 4.4 - Low Effect - American kestrel
2700000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
5100000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
6100000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
10000000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
10000000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
10000000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
10000000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
15000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
18000000000
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 190: Benchmark Values for U−234 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	4.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.300000e+07	3
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.000000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.300000e+08	3
LANL ECORISK	Rad Surface Water No Effect	American robin	2.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Algae	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Fish	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.100000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.100000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.500000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	1.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Algae	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Fish	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.100000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.100000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.500000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	1.800000e+10	

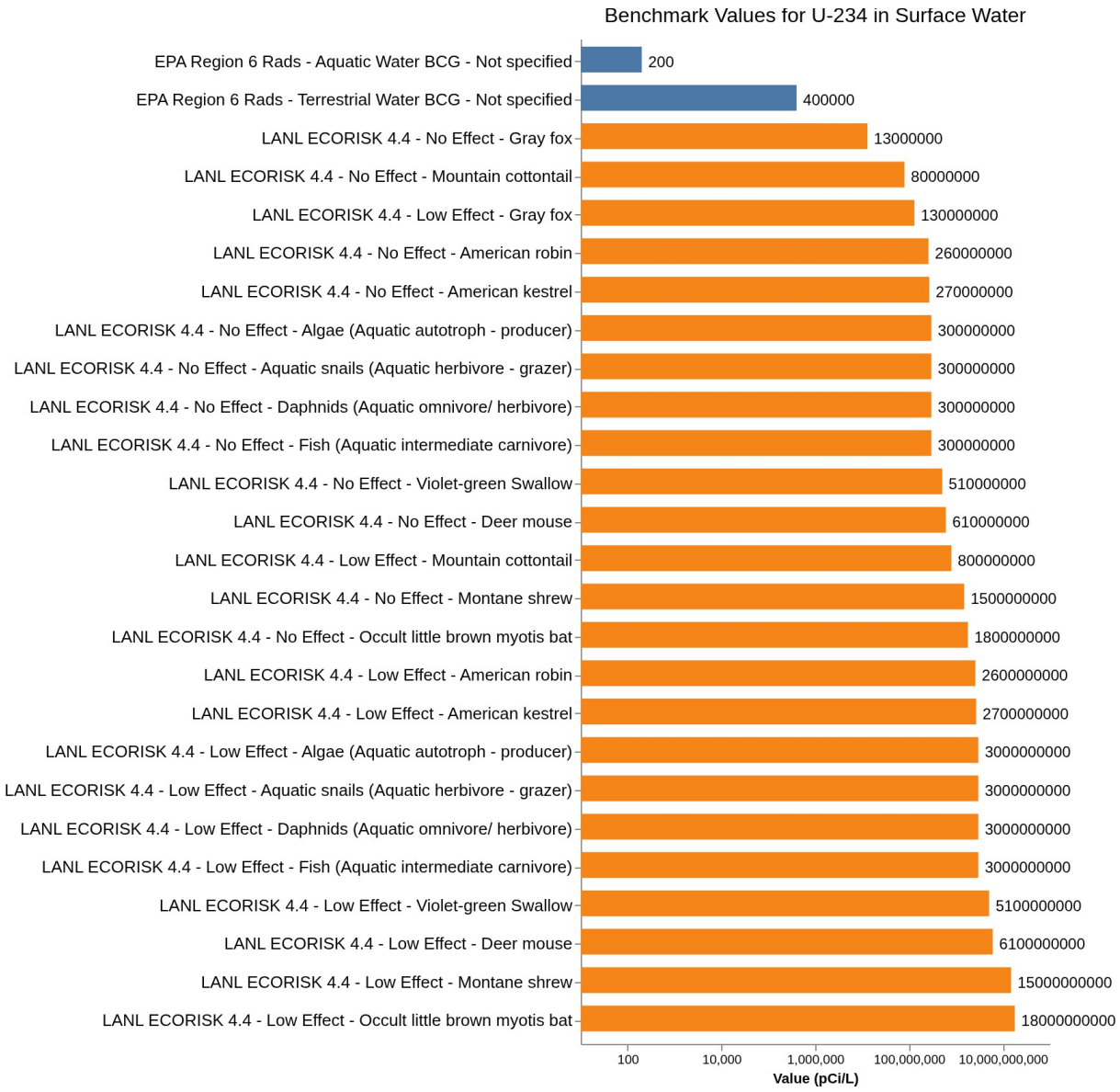

Benchmark Values for U-234 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
200
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
400000
LANL ECORISK 4.4 - No Effect - Gray fox
13000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
80000000
LANL ECORISK 4.4 - Low Effect - Gray fox
130000000
LANL ECORISK 4.4 - No Effect - American robin
260000000
LANL ECORISK 4.4 - No Effect - American kestrel
270000000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
300000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
300000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
300000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
300000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
510000000
LANL ECORISK 4.4 - No Effect - Deer mouse
610000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
800000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1500000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
1800000000
LANL ECORISK 4.4 - Low Effect - American robin
2600000000
LANL ECORISK 4.4 - Low Effect - American kestrel
2700000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
3000000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
3000000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
3000000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
3000000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
5100000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
6100000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
15000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
18000000000
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 191: Benchmark Values for U−235 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	4.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Algae	1.000000e+07	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	1.000000e+07	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	1.000000e+07	3
LANL ECORISK	Rad Surface Water No Effect	Fish	1.000000e+07	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.500000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.700000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	1.000000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	1.000000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	1.000000e+08	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	1.000000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.500000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	2.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.600000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.600000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.600000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.000000e+10	

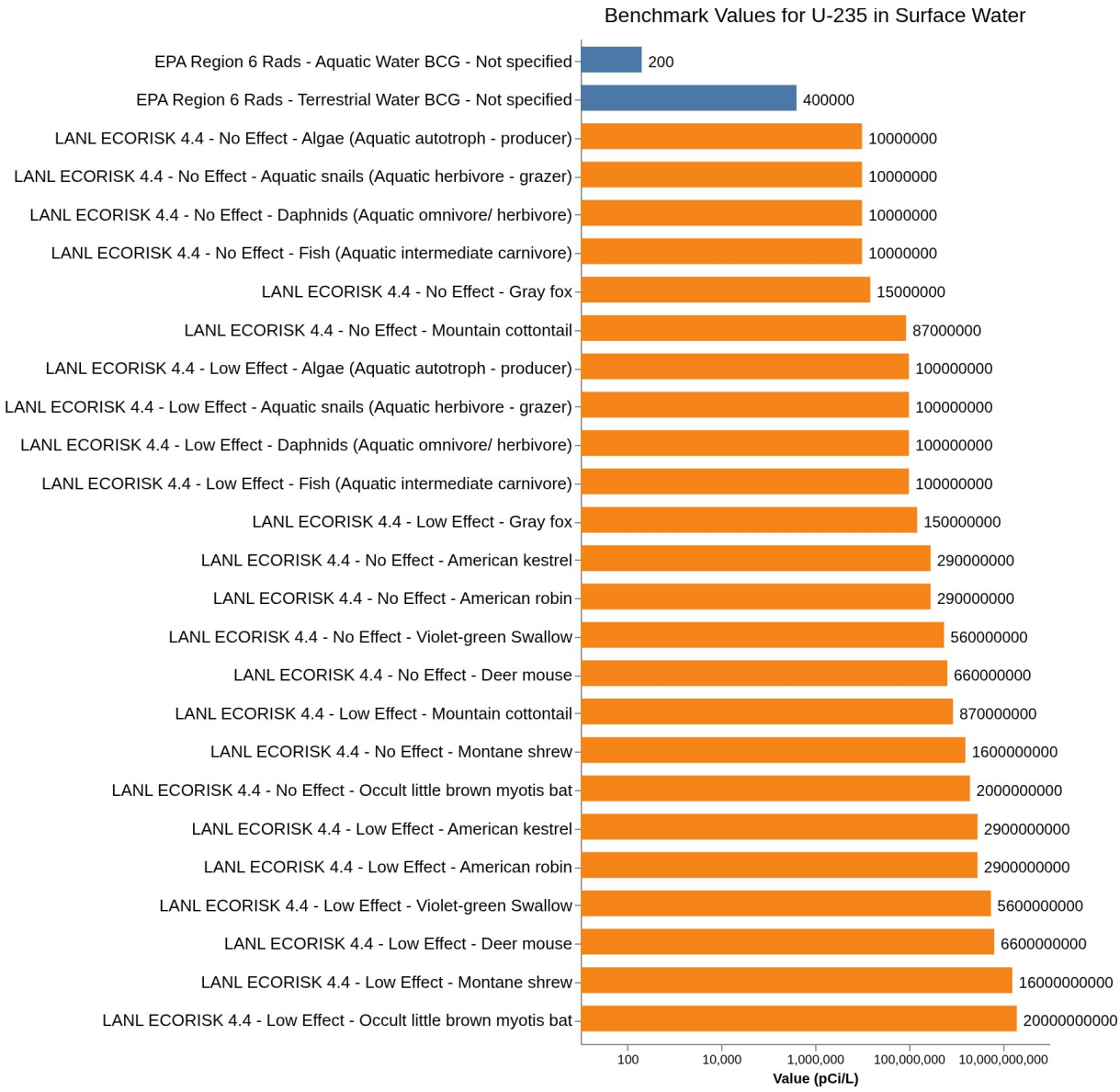

Benchmark Values for U-235 in Surface Water
EPA Region 6 Rads - Aquatic Water BCG - Not specified
200
EPA Region 6 Rads - Terrestrial Water BCG - Not specified
400000
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
10000000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
10000000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
10000000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
10000000
LANL ECORISK 4.4 - No Effect - Gray fox
15000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
87000000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
100000000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
100000000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
100000000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
100000000
LANL ECORISK 4.4 - Low Effect - Gray fox
150000000
LANL ECORISK 4.4 - No Effect - American kestrel
290000000
LANL ECORISK 4.4 - No Effect - American robin
290000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
560000000
LANL ECORISK 4.4 - No Effect - Deer mouse
660000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
870000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1600000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
2000000000
LANL ECORISK 4.4 - Low Effect - American kestrel
2900000000
LANL ECORISK 4.4 - Low Effect - American robin
2900000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
5600000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
6600000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
16000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
20000000000
100
10,000
1,000,000
100,000,000
10,000,000,000
Value (pCi/L)

Table 192: Benchmark Values for U−236 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
LANL ECORISK	Rad Surface Water No Effect	Algae	8.500000e+05	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	8.500000e+05	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	8.500000e+05	3
LANL ECORISK	Rad Surface Water No Effect	Fish	8.500000e+05	
LANL ECORISK	Rad Surface Water Low Effect	Algae	8.500000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	8.500000e+06	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	8.500000e+06	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	8.500000e+06	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.400000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.600000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.400000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	2.800000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	2.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.500000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.600000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.600000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.600000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.500000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.600000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.000000e+10	

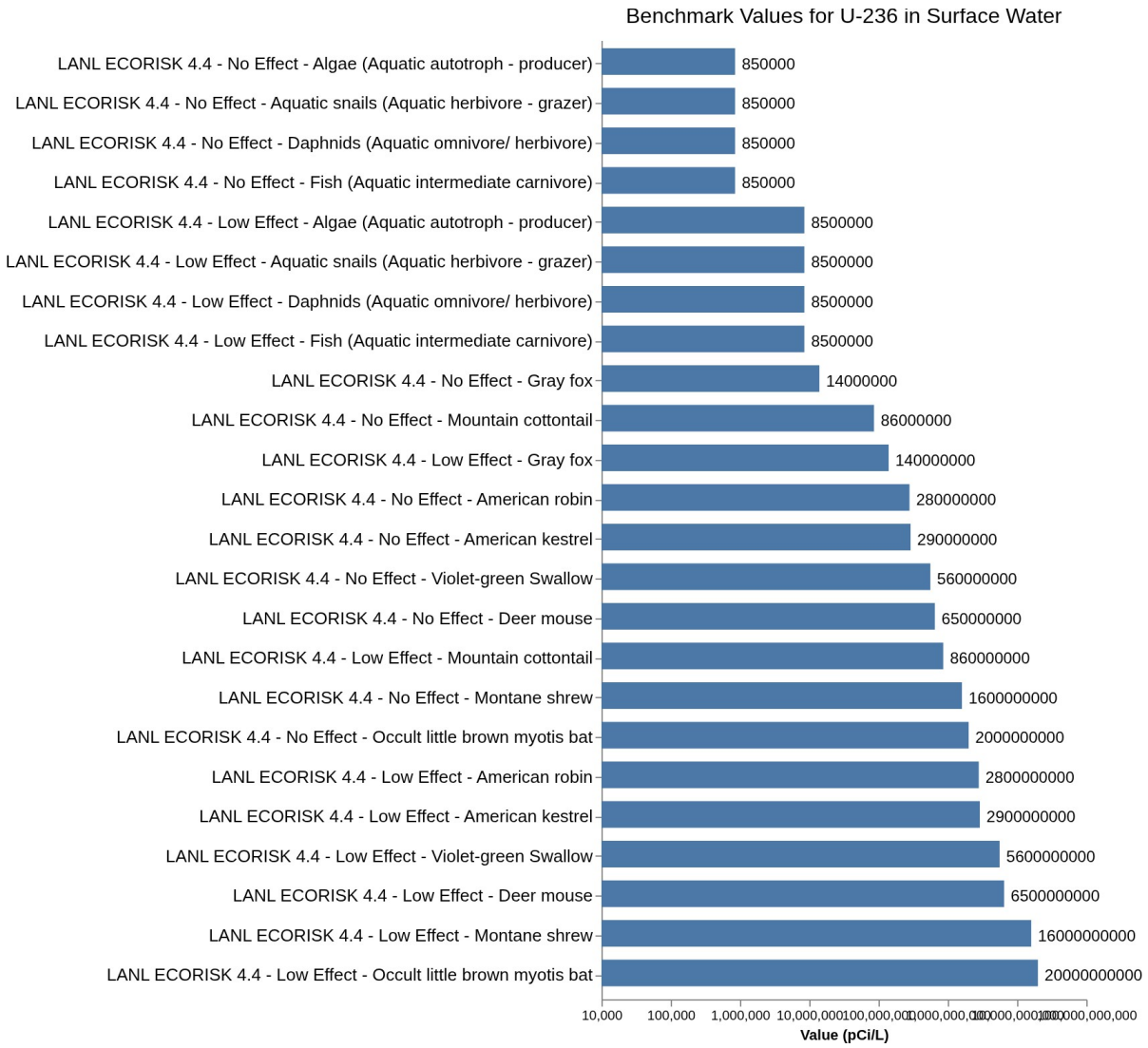

Benchmark Values for U-236 in Surface Water
LANL ECORISK 4.4 - No Effect - Algae (Aquatic autotroph - producer)
850000
LANL ECORISK 4.4 - No Effect - Aquatic snails (Aquatic herbivore - grazer)
850000
LANL ECORISK 4.4 - No Effect - Daphnids (Aquatic omnivore/ herbivore)
850000
LANL ECORISK 4.4 - No Effect - Fish (Aquatic intermediate carnivore)
850000
LANL ECORISK 4.4 - Low Effect - Algae (Aquatic autotroph - producer)
8500000
LANL ECORISK 4.4 - Low Effect - Aquatic snails (Aquatic herbivore - grazer)
8500000
LANL ECORISK 4.4 - Low Effect - Daphnids (Aquatic omnivore/ herbivore)
8500000
LANL ECORISK 4.4 - Low Effect - Fish (Aquatic intermediate carnivore)
8500000
LANL ECORISK 4.4 - No Effect - Gray fox
14000000
LANL ECORISK 4.4 - No Effect - Mountain cottontail
86000000
LANL ECORISK 4.4 - Low Effect - Gray fox
140000000
LANL ECORISK 4.4 - No Effect - American robin
280000000
LANL ECORISK 4.4 - No Effect - American kestrel
290000000
LANL ECORISK 4.4 - No Effect - Violet-green Swallow
560000000
LANL ECORISK 4.4 - No Effect - Deer mouse
650000000
LANL ECORISK 4.4 - Low Effect - Mountain cottontail
860000000
LANL ECORISK 4.4 - No Effect - Montane shrew
1600000000
LANL ECORISK 4.4 - No Effect - Occult little brown myotis bat
2000000000
LANL ECORISK 4.4 - Low Effect - American robin
2800000000
LANL ECORISK 4.4 - Low Effect - American kestrel
2900000000
LANL ECORISK 4.4 - Low Effect - Violet-green Swallow
5600000000
LANL ECORISK 4.4 - Low Effect - Deer mouse
6500000000
LANL ECORISK 4.4 - Low Effect - Montane shrew
16000000000
LANL ECORISK 4.4 - Low Effect - Occult little brown myotis bat
20000000000
10,000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
10,000,000,000
100,000,000,000
Value (pCi/L)

Table 193: Benchmark Values for U−238 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	2.000000e+02	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	4.000000e+05	
LANL ECORISK	Rad Surface Water No Effect	Algae	4.300000e+06	
LANL ECORISK	Rad Surface Water No Effect	Aquatic snails	4.300000e+06	
LANL ECORISK	Rad Surface Water No Effect	Daphnids	4.300000e+06	3
LANL ECORISK	Rad Surface Water No Effect	Fish	4.300000e+06	
LANL ECORISK	Rad Surface Water No Effect	Gray fox	1.500000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Algae	4.300000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Aquatic snails	4.300000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Daphnids	4.300000e+07	3
LANL ECORISK	Rad Surface Water Low Effect	Fish	4.300000e+07	
LANL ECORISK	Rad Surface Water No Effect	Mountain cottontail	8.900000e+07	
LANL ECORISK	Rad Surface Water Low Effect	Gray fox	1.500000e+08	
LANL ECORISK	Rad Surface Water No Effect	American robin	2.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	American kestrel	3.000000e+08	
LANL ECORISK	Rad Surface Water No Effect	Violet−green Swallow	5.700000e+08	
LANL ECORISK	Rad Surface Water No Effect	Deer mouse	6.800000e+08	
LANL ECORISK	Rad Surface Water Low Effect	Mountain cottontail	8.900000e+08	
LANL ECORISK	Rad Surface Water No Effect	Montane shrew	1.700000e+09	
LANL ECORISK	Rad Surface Water No Effect	Occult little brown myotis bat	2.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American robin	2.900000e+09	
LANL ECORISK	Rad Surface Water Low Effect	American kestrel	3.000000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Violet−green Swallow	5.700000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Deer mouse	6.800000e+09	
LANL ECORISK	Rad Surface Water Low Effect	Montane shrew	1.700000e+10	
LANL ECORISK	Rad Surface Water Low Effect	Occult little brown myotis bat	2.000000e+10	

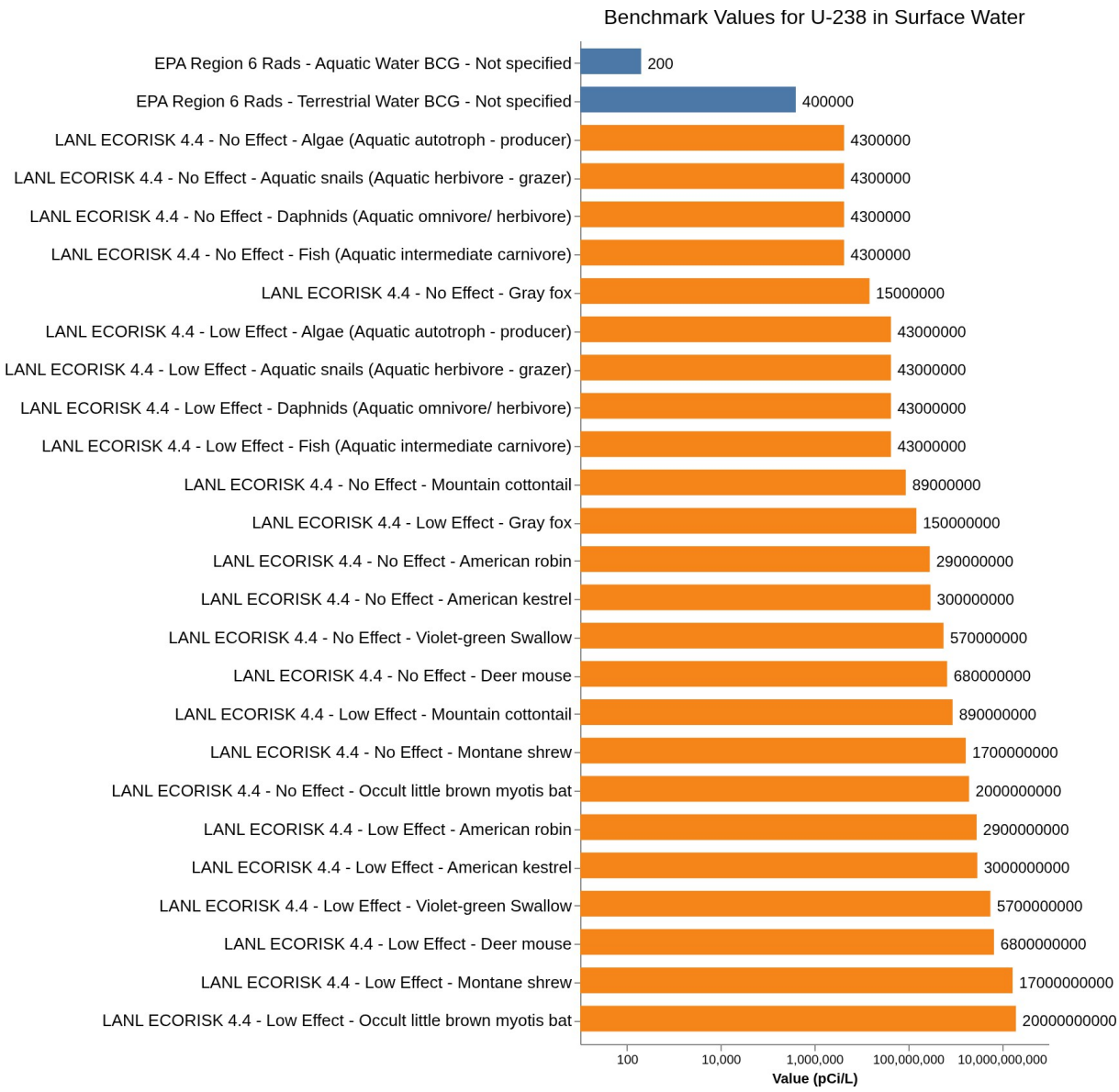


Table 194: Benchmark Values for Zn−65 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	10.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	200000.0	

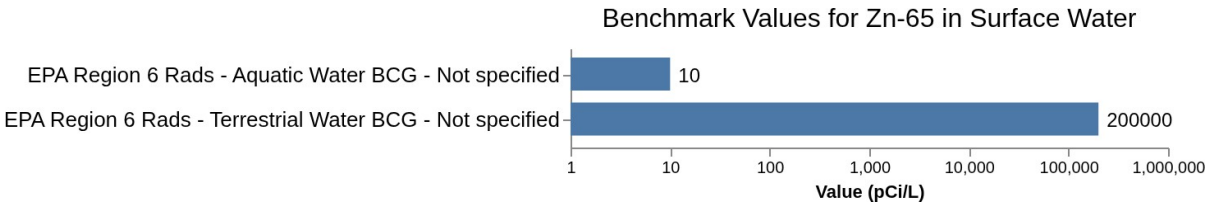
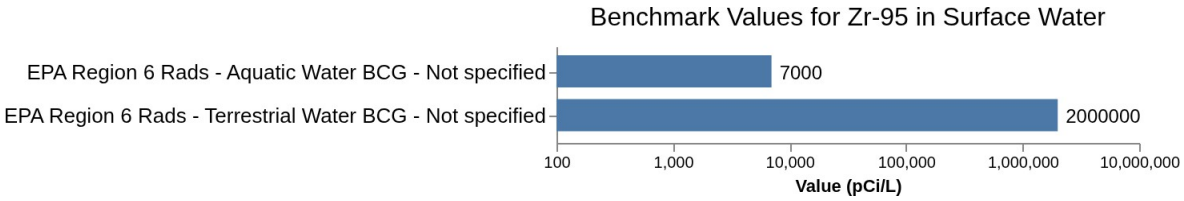


Table 195: Benchmark Values for Zr−95 in Surface Water

Source	Benchmark	Organism	Value (pCi/L)	Footnotes
EPA Region 6	Rads − Aquatic Water BCG	Not specified	7000.0	
EPA Region 6	Rads − Terrestrial Water BCG	Not specified	2000000.0	



10. CHEMICAL FOOTNOTES

1. Screening value is for filtered (dissolved) metals. A conversion factor (CF) was used to convert the screening value for total metals in surface water to a screening value for dissolved metals in surface water. CMC (dissolved) = CMC (total) × CF.
2. The freshwater screening value is hardness dependent. The screening value shown is for dissolved metals assuming a hardness of 50 mg/L as CaCO3. See Table 1C for screening values for varying degrees of water hardness.
3. Freshwater criteria for pentachlorophenol are pH Dependent. Values displayed are for a pH of 7.8.
4. Criteria for ammonia are pH, temperature, and lifestage dependent.
5. Selenium concentrations in water do not reflect dietary sources to aquatic life and screening against these numbers may not be adequately protective.
6. pH of 6.5−9.0
7. Bioaccumulative chemical
8. Sum for the Toxic Unit Approach. (See Table 2c at Region 4 Ecological Risk Assessment Supplemental Guidance)
9. Total value for Low Molecular Weight PAHs.
10. Total value for High Molecular Weight PAHs.
11. Subject to a narrative assessment. See Region 4 Ecological Risk Assessment Supplemental Guidance.
12. For hardness−dependent metals, freshwater chronic criteria are based on soft water with a total hardness of 50 mg/L as CaCO3. Soft water is common within Region 5; this water ESL may be recalculated when site specific water hardness is less than 50 mg/L.
13. Freshwater criteria for pentachlorophenol are pH Dependent. Values displayed are for a pH of 6.5.
14. The freshwater BTAG for Hydrazine depends on the hardness level. For hardness < 50, the BTAG is 5 ug/L. For hardness => 50, the BTAG is 10 ug/L.
15. Potential ecological risks associated with aluminum in soils are based on the measured soil pH. Where aluminum is a COC, it should only be retained for those soils with a pH less than 5.5. U.S. EPA. 2003. Ecological soil screening level for aluminum. Interim final. OSWER directive 9285.7−60. Washington.
16. Iron is not expected to be toxic to plants in well−aerated soils between pH 5 and 8. Importance is based less on its direct chemical toxicity than on its effect as a mediator in the geochemistry of other toxic metals and the physical hazard of depositing flocculent. EPA. 2003. Ecological soil screening levels for iron. Interim final. OSWER directive 9285.7−69. Washington.
17. When benchmarks represent the sum of individual compounds, isomers, or groups of congeners, and the chemical analysis indicates an undetected value, the proxy value specified at 30 TAC 350.51(n) shall be used for calculating the sum of the respective compounds, isomers, or congeners. This assumes that the particular COC has not been eliminated in accordance with the criteria at 350.71(k).
18. The low molecular weight PAH benchmark is to be compared to the sum of the concentrations of the following compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, and 2−methyl naphthalene. The PAH benchmark is not the sum of the corresponding benchmarks listed for the individual compounds.
19. The high molecular weight PAH benchmark is to be compared to the sum of the concentrations of the following compounds: fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluroanthene, indeno(1,2,3−cd)pyrene, benzo(g,h,i)perylene, and dibenzo(a,h)anthracene. The PAH benchmark is not the sum of the corresponding benchmarks listed for the individual compounds.
20. Total PAH refers to the sum of the concentrations of each of low and high molecular weight PAHs listed above and any other PAH compounds that are not eliminated in accordance with 30 TAC 350.71(k). The benchmarks for total PAHs are the most relevant in evaluating risk in an ERA, as PAHs almost always occur as mixtures. Values for individual, low molecular weight, and high molecular weight PAHs are included as guidelines to aid in the determination of disproportionate concentrations within the mixture that may be masked by the total.
21. Indicates that the benchmarks are for the dissolved portion in water.
22. Value was reported as greater than the listed number.
23. Value was reported as less than the listed number.
24. These values are estimates. Methods of estimation are described in Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision.
25. A range of 0.8 to 4.0 ug/L was reported.
26. The chronic NAWQC for mercury (0.012 μg/L) is based on the final residue value. FCVs are used as benchmarks to protect aquatic life.

27. The chronic NAWQC for DDT (0.001 μg/L), total PCBs (0.014 μg/L), and heptachlor (0.0038 μg/l) are based on the final residue values; for benchmarks to protect aquatic life, we use SCVs.
28. Units are in mg/Kg dry weight.
29. These values are estimates. Methods of estimation are described in the reference.
30. Study LC50s were used rather than species mean LC50s, so water hardness would correspond to EC20 values.
31. Benchmarks are based on tests that are not standard but are judged to be of high quality.
32. The value's sediment quality assessment guidelines (SQAGs) are within a factor of three of the probable effects level (PEL).
33. These values have a presumed maximum TOC of 10% (0.1) applied to the values from the source for use in comparing to bulk sediment data. If the TOC in measured data is less than 10%, adjust values accordingly.
34. These values have a presumed TOC of 1% (0.01) applied to the values from the source for use in comparing to bulk sediment data.
35. See Methylmercury.
36. Consult the 2010 Polycyclic Aromatic Hydrocarbons factsheet or the 2010 PAH Scientific Supporting Document for guidance.
37. Surface Coarse 0.082 mg/kg. Surface Fine 0.018 mg/kg. Subsoil Coarse 0.082 mg/kg. Subsoil Fine 0.018 mg/kg.
38. Coarse Soil Guideline 4.6 mg/kg. Fine Soil Guideline 5.6 mg/kg. Coarse Soil Human health soil quality guideline 4.6 mg/kg. Fine Soil Human health soil quality guideline 4.6 mg/kg, Coarse Soil Environmental soil quality guideline 7.7 mg/kg. Fine Soil Environmental soil quality guideline 190 mg/kg.
39. SQGF Coarse 0.49 mg/kg. SQGF Fine 6.5 mg/kg.
40. Surface Coarse 0.37 mg/kg. Surface Fine 0.08 mg/kg. Subsoil Coarse 0.37 mg/kg. Subsoil Fine 0.08 mg/kg.
41. Surface Coarse 11 mg/kg. Surface Fine 2.4 mg/kg. Subsoil Coarse 11 mg/kg. Subsoil Fine 2.4 mg/kg.
42. 10−5 Incremental Risk − Surface Coarse 0.030 mg/kg. 10−5 Incremental Risk − Surface Fine 0.0068 mg/kg.
    10−5 Incremental Risk − Subsoil Coarse 0.030 mg/kg. 10−5 Incremental Risk − Subsoil Fine 0.0068 mg/kg.
    10−6 Incremental Risk − Surface Coarse 0.030 mg/kg. 10−6 Incremental Risk − Surface Fine 0.0068 mg/kg.
    10−6 Incremental Risk − Subsoil Coarse 0.030 mg/kg. 10−6 Incremental Risk − Subsoil Fine 0.0068 mg/kg.
43. SQGF Coarse 6.5 mg/kg. SQGF Fine 21 mg/kg.
44. 10−5 Incremental Risk − Surface Coarse 0.030 mg/kg. 10−5 Incremental Risk − Surface Fine 0.0068 mg/kg.
    10−5 Incremental Risk − Subsoil Coarse 0.030 mg/kg. 10−5 Incremental Risk − Subsoil Fine 0.0068 mg/kg.
    10−6 Incremental Risk − Surface Coarse 0.0095 mg/kg. 10−6 Incremental Risk − Surface Fine 0.0068 mg/kg.
    10−6 Incremental Risk − Subsoil Coarse 0.011 mg/kg. 10−6 Incremental Risk − Subsoil Fine 0.0068 mg/kg.
45. This value was derived using TEFs. See the fact sheet for supporting documentation.
46. 500 μg/L for blackberries; 500−1000 μg/L for peaches, cherries, plums, grapes, cowpeas, onions, garlic, sweet potatoes, wheat barley, sunflowers, mung beans, sesame, lupins, strawberries, Jerusalem arti- chokes, kidney beans, and lima beans; 1000−2000 μg/L for red peppers, peas, carrots, radishes, potatoes, and cucumbers; 2000−4000 μg/L for lettuce, cabbage, celery, turnips, Kentucky bluegrass, oats, corn, artichokes, tobacco, mustard, clover, squash, and muskmelons; 4000−6000 μg/L for sorghum, tomatoes, alfalfa, purple vetch, parsley, red beets, and sugar beets; 6000 μg/L for asparagus.
47. Foliar: 100−178 mg/L for almond apricots and plums; 178−355 mg/L for grapes, peppers, potatoes and tomatoes; 355−710 mg/L for alfalfa, barley, corn, and cucumbers; >710 mg/L for cauliflower, cotton, safflower, sesame, sorghum, sugar beets, and sunflowers. Rootstocks: 180−600 mg/L for stone fruit (peaches, plums, etc.); 710−900 mg/L for grapes. Cultivars: 110−180 mg/L for strawberries, 230−460 mg/L for grapes, 250 mg/L for boysenberries, blackberries, and raspberries.
48. 200 μg/L for cereals, 1000 μg/L for tolerant crops.
49. The concentration should not exceed 10 μg/L for continuous use on all soils or 50 μg/L for short-term use on acidic soils.
50. 20 μg/L for continuous use on all soils, 50 μg/L for intermittent use on all soils.
51. 500 mg/L for strawberries, raspberries, beans, and carrots. 500−800 mg/L for boysenberries, currants, blackberries, gooseberries, plums, grapes, apricots, peaches, pears, cherries, apples, onions, parsnips, radishes, peas, pumpkins, lettuce, peppers, muskmelons, sweet potatoes, sweet corn, potatoes, celery, cabbage, kohlrabi, cauliflower, cowpeas, broad beans, flax, sunflowers, and corn. 800−1500 mg/L for spinach, cantaloupe, cucumbers, tomatoes, squash, brussels sprouts, broccoli, turnips, smooth brome, alfalfa, big trefoil, beardless wildrye, vetch, timothy, and crested wheat grass. 1500−2500 mg/L for beets, zucchini, rape, sorghum, oat hay, wheat hay, mountain brome, tall fescue, sweet clover, reed canary grass, birds foot trefoil, perennial ryegrass. 3500 mg/L for asparagus, soybeans, safflower, oats, rye, wheat, sugar beets, barley, barley hay, and tall wheat grass.
52. 1000 μg/L when soil pH < 6.5. 5000 μg/L when soil pH > 6.5.

53. 500 μg/L for sheep, 1000 μg/L for cattle, 5000 μg/L for swine and poultry.
54. The maximum concentration in livestock drinking water should not exceed 2000 μg/L, or 1000 μg/L in cases where the feed of animals contains fluoride.
55. The short−term benchmark concentration of 1.0 μg·L−1 is for waters of 50 mg CaCO3·L−1 hardness. The short−term benchmark for cadmium is related to water hardness (as CaCO3): When the water hardness is 0 to < 5.3 mg/L, the short−term benchmark is 0.11 μg/L. At hardness ≥ 5.3 to ≤ 360 mg/L, the short−term benchmark is calculated using this equation: Short−term benchmark (μg/L) = 10{1.016(log[hardness]) –1.71 }. At hardness > 360 mg/L, the short−term benchmark is 7.7 μg/L.
56. Benchmark = exp(0.878[ln(hardness)] + 4.76), where the benchmark is expressed in dissolved manganese concentration (μg/L), and hardness is measured as CaCO3 equivalents in mg/L.
57. 5 μg/L if pH < 6.5. 100 μg/L if pH ≥ 6.5.
58. The CWQG for cadmium (i.e., long−term guideline) of 0.09 μg·L−1 is for waters of 50 mg CaCO3·L−1 hardness. The CWQG for cadmium is related to water hardness (as CaCO3): When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 μg/L. At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (μg/L) = 10{0.83(log[hardness]) – 2.46 }. At hardness > 280 mg/L, the CWQG is 0.37 μg/L.
59. The CWQG for copper is related to water hardness (as CaCO3): When the water hardness is 0 to < 82 mg/L, the CWQG is 2 μg/L. At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (μg/L) = 0.2 * e{0.8545[ln(hardness)]−1.465}. At hardness >180 mg/L, the CWQG is 4 μg/L. If the hardness is unknown, the CWQG is 2 μg/L.
60. The CWQG for lead is related to water hardness (as CaCO3): When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 μg/L. At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (μg/L)= e{1.273[ln(hardness)]−4.705}. At hardness >180 mg/L, the CWQG is 7 μg/L. If the hardness is unknown, the CWQG is 1 μg/L.
61. The CWQG for manganese (i.e., long−term guideline) is found using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese.
62. The CWQG for nickel is related to water hardness (as CaCO3): When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 μg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (μg/L) = e{0.76[ln(hardness)]+1.06}. At hardness >180 mg/L, the CWQG is 150 μg/L. If the hardness is unknown, the CWQG is 25 μg/L.
63. Canadian Guidance Framework for Phosphorus is for developing phosphorus guidelines (does not provide guidance on other freshwater nutrients). It provides Trigger Ranges for Total Phosphorus (μg/L) (see Guidance Framework for Phosphorus factsheet): ultra−oligotrophic <4, oligotrophic 4−10, mesotrophic 10−20, meso−eutrophic 20−35, eutrophic 35−100, hyper−eutrophic >100.
64. The long−term CWQG is for dissolved zinc and is calculated using the following equation: CWQG = exp(0.947[ln(hardness mg·L−1)] − 0.815[pH] + 0.398[ln(DOC mg·L−1)] + 4.625). The short−term bench- mark is for dissolved zinc and is calculated using the following equation: Benchmark = exp(0.833[ln(hardness mg·L−1)] + 0.240[ln(DOC mg·L−1)] + 0.526).
65. Supporting documents are available from the Canadian Council of Ministers of the Environment.
66. The listed values are dry weight.
67. This is a reactive species.
68. Guideline is crop−specific: Cereals and hay value is 46 ug/L and Legumes value is 93 ug/L, per the British Columbia data catalog.
69. Active ingredient WQG is 490 ug/L per the British Columbia data catalog.
70. Guideline is crop-specific. The value listed of 0.071 ug/L applies to crops other than cereals, hay, and pastures (e.g., tomato). The value of 3.3 ug/L applies to cereals, hay, and pastures per the British Columbia data catalog.
71. The contents of the measured substances are lower than the Intervention Value for soil, not being the bed or bank of a surface water body, and for organic substances: msPAF < 20%
72. The contents of the measured substances are lower than the Intervention Value for soil, not being the bed or bank of a surface water body, and for metals: msPAF < 50%, with a maximum content for cadmium.
73. This values is a so−called 'Indicative Level'. No reliable Intervention Value could be derived. Indicative Levels are based on the same principles as Intervention Values but have a lower status.
74. This is organic mercury.
75. The three types of dihydroxybenzenes are catechol, resorcinol, and hydroquinone.
76. This chemical was given a value 50 mg/kg for falling under the monochloroanilines category.
77. This chemical was given a value of 50 mg/kg for falling under the dichloroanilines category.
78. This chemical was given a value of 10 mg/kg for falling under the trichloroanilines category.
79. This chemical was given a value of 30 mg/kg for falling under the tetrachloroanilines category.

80. This chemical was given a value of 10 mg/kg for falling under the pentachloroanilines category.
81. The listed value is valid when Aluminum's pH is greater than 6.5. If the pH is less than 6.5, then it has an unknown LOSP value of 0.0008 mg/kg.
82. The Marine Water value was blank from the source, but the Freshwater value is presented as a reference. For other chemical benchmarks from this source, the Freshwater value is often recommended as a cautionary substitute for Marine Waters.
83. The toxicant reliability of these values is unknown.
84. The toxicant reliability of these values is very low.
85. The toxicant reliability of these values is very high.
86. The toxicant reliability of these values is high.
87. The toxicant reliability of these values is low.
88. The toxicant reliability of these values is moderate.
89. Recommended for application for slightly to moderately disturbed ecosystems. If the LOSP 99 is recommended, it is due to the bioaccumulating nature of the toxicant. This application protects key species from acute and chronic toxicity.
90. Recommended for application for slightly to moderately disturbed ecosystems (to protect key species from chronic toxicity). However, this DGV may still not protect key test species from chronic toxicity (this refers to experimental chronic values or geometric mean for species).
91. DGV may be below routine limits of reporting for most commercial laboratories, although some laboratories may be able to achieve lower limits of reporting.
92. DGV may not protect key test species from acute (and chronic) toxicity.
93. Recommended for application for slightly to moderately disturbed ecosystems. Although bioaccumulation may be an issue, rapid depuration of this chemical represents a mitigating factor, and the 95% species protection DGV should provide sufficient protection for slightly−moderately disturbed systems. If local data suggest that bioaccumulation is an issue at the specific site, the 99% protection level may be more appropriate.
94. DGV may not protect key test species from chronic toxicity (this refers to experimental chronic values or geometric mean for species).
95. This value was derived from an acute toxicity dataset comprising 23 species from three taxonomic groups (but which did not include plants). As diuron is a herbicide, the value should be treated with additional caution.
96. This DGV is derived from mesocosm NOEC data. This is the only DGV available for this toxicant.
97. Bioaccumulation and secondary poisoning effects should be considered for this toxicant. To account for the bioaccumulating nature of this toxicant, it is recommended to apply the species protection level DGV that is one level above that which would normally be applied (e.g., if 95% level of species protection would normally be applied, then the 99% DGV should be used).
98. Bioaccumulation and secondary poisoning effects should be considered for this toxicant. Tainting or flavour impairment of fish flesh might occur at concentrations below the DGV. To account for the bioaccumulating nature of this toxicant, it is recommended to apply the species protection level DGV one level above that which would normally be applied (e.g., if 95% level of species protection would normally be applied, then the 99% DGV should be used). Tainting or flavour impairment of fish flesh might occur at concentrations below the DGV.
99. Bioaccumulation and secondary poisoning effects should be considered for this toxicant. Tainting or flavour impairment of fish flesh might occur at concentrations below the DGV.
100. Bioaccumulation and secondary poisoning effects should be considered for this toxicant. Tainting or flavour impairment of fish flesh might occur at concentrations below the DGV. These DGVs and the information in the corresponding DGVs technical brief for this toxicant should be used in accordance with the detailed guidance provided on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality website.
101. Bioaccumulation and secondary poisoning effects should be considered for this toxicant.
102. Ammonia as total ammonia nitrogen, measured as [NH3−N] at pH 8.
103. The DGVs apply to dissolved boron and are based on data from toxicity tests conducted for a pH range of 6.8–10 and hardness range of 9.3–250 mg CaCO3/L. They supersede the ANZECC/ARMCANZ (2000) trigger values for boron in freshwater.
104. Adjust DGVs for site−specific hardness using the hardness−dependent algorithm in Warne et al. (2018).
105. Chlorine as total chlorine, measured as [Cl].
106. The copper DGVs should not be adjusted for water hardness (see Warne et al. 2018).
107. Cyanide as un−ionized HCN, measured as [CN].

108. The DGVs are expressed in terms of the active ingredient (glyphosate) and do not relate to any of the breakdown products of glyphosate. They supersede the ANZECC/ARMCANZ (2000) trigger values for glyphosate in freshwater. Commercial formulations containing glyphosate can be more toxic than glyphosate alone. The Guidelines provide guidance on how to account for formulations (Also see Warne et al. 2018).
109. Sulfide as un−ionized H2S, measured as [S].
110. The DGVs relate to metolachlor only and not any of its breakdown products.
111. The DGVs are expressed in terms of the active ingredient (metsulfuron−methyl) and do not relate to any of the breakdown products of metsulfuron−methyl. They supersede the ANZECC/ARMCANZ (2000) trigger values for metsulfuron in freshwater. These DGVs and the information in the corresponding DGVs technical brief for this toxicant should be used in accordance with the detailed guidance provided on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality website, including guidance on what to do if DGVs are below analytical detection limits.
112. The value listed as the saltwater CMC represents a benchmark value, not a criterion. Data limitations precluded the development of a CCC in saltwater.
113. The listed value of 0.752 mg/L is at a pH level of 6.5 with a temperature of 20°C. For information on other temperatures and pH levels, refer to Table 3 here.
114. The listed value of 0.000038 mg/L is a lower−bound short−term maximum for varying water hardness and an upperbound maximum of 2.80 ug/L.
115. This value is a result of a pH level of 6.7 and 10°C. For information on other temperatures and pH levels, refer to Table 3 here.
116. The listed value of 0.4 mg/L is a maximum, where the water hardness is 10 mg/L; otherwise, use the equation: LC50 fluoride = −51.73 + 92.57 log10 (Hardness) and multiply by 0.01.
117. Dissolved Pb WQG = exp(0.514 [ln(DOC)] + 0.214[ln(hardness)] + 0. 4354)
118. The listed value of 0.06 mg/L is for a chloride concentration of less than 2; 0.12 mg/L with a chloride concentration of 2−4; 0.18 mg/L with a chloride concentration of 4−6; 0.24 mg/L of a chloride concentration of 6−8; 0.3 mg/L with a chloride concentration of 8−10; and 0.6 mg/L with a chloride concentration greater than 10.
119. Instantaneous maximum calculated from: less than or equal to 0.01102 hardness + 0.54.
120. The listed value of 0.003 mg/L is for use under non−phototoxic conditions. For use under phototoxic conditions, the value 0.00005 mg/L should be used.
121. $WQG=[e^{\{}[0.645\cdot\ln(DOC)]+[2.255\cdot\ln(hardness)]+[1.995\cdot pH]+[-0.284\cdot(\ln(hardness)\cdot pH)]-9.898^{\}}]/3$ (e.g., for a water with the following chemistry (pH = 7.5, DOC = 0.5 mg/L, hardness = 50 mg/L) the AWQG is 55 μg Al/L (total Al).
122. The listed value of 1.22 mg/L is at a pH level of 6.5 with a temperature of 20°C. For information on other temperatures and pH levels, refer to Table 27C here.
123. The listed value of 0.004 mg/L is for use under non−phototoxic conditions. For use under phototoxic conditions, the value 0.0001 mg/L should be used.
124. The listed value of 0.0001 mg/L should be used under both non−phototoxic and phototoxic conditions.
125. The listed value of 0.0000176 mg/L is a lower−bound long−term average for varying water hardness and an upperbound average of 0.457 ug/L.
126. Average of five weekly measurements taken over a 30−day period. Calculated from: less than or equal to 0.0044 hardness + 0.605.
127. When MeHg = 0.5% of THg, the listed value of 0.00002 mg/L should be used. When MeHg = 1.0% of THg, the value of 0.01 ug/L should be used. When MeHg 8.0% of THg, the value of 0.00125 ug/L should be used.
128. The listed value of 0.02 mg/L is for a chloride concentration of less than 2; 0.04 mg/L for a chloride concentration of 2−4; 0.06 mg/L for a chloride concentration of 4−6; 0.08 mg/L for a chloride concentration of 6−8; 0.10 mg/L for a chloride concentration of 8−10; and 0.20 mg/L for a chloride concentration of more than 10.
129. Guideline is for lakes where salmonids are the predominant fish species. Total phosphorus in lakes is either the spring overturn concentration, if the residence time of the epilimnetic water exceeds 6 months, or the mean epilimnetic growing season concentration, if residence time of epilimnetic water is below 6 months.
130. The listed value of 0.00002 mg/L is for use under phototoxic conditions.
131. The listed value of 0.00005 mg/L is for use when hardness is less than or equal to 100 mg/L. If hardness is greater than 100 mg/L, then use the value of 1.5 ug/L.
132. Sulfate is dependent on water hardness (mg/L). The listed value of 128 is for a water hardness of very soft (0−30). 218 is for soft to moderately soft water hardness (31−75). 309 is for moderately soft/hard to hard water hardness (76−180). 429 is for very hard water hardness (181−250). For anything greater than 250, it needs to be determined based on site water.

133. The long−term chronic WQC = [exp(0.947[ln(hardness)] − 0.815[pH] + 0.398[ln(DOC)] + 4.625)] / 2. The short−term acute WQC = [exp(0.833[ln(hardness)] + 0.240[ln(DOC)] + 0.526)] / 2.
134. Sediment containing 1% organic carbon.
135. The listed value of 11 mg/kg applies to fish egg/ovary. A value of 4 mg/kg applies to fish muscle/muscle plug, fish, whole−body, and invertebrate tissue (dietary). This is Aquatic Life− Freshwater Long−term Chronic.
136. Duration < 2 hours within 24 hour period.
137. Human activities should not cause the chloride of marine and estuarine waters to fluctuate by more than 10% of the natural chloride expected at that time and depth.
138. Applies to all soil types.
139. The listed value of 0.2 mg/L is for all soil types except neutral and alkaline. 400 ug/L should be used for neutral and alkaline fine textured soils.
140. The listed value is only for forage crops.
141. The listed value of 2 mg/L is for moderately sensitive crops (red pepper, pea, carrot, radish, potato, cu- cumber). 4 mg/L is for moderately tolerant crops (lettuce, cabbage, celery, turnip, Kentucky bluegrass, oat, corn, artichoke, tobacco, mustard, clover, squash, muskmelon). 1 mg/L is for sensitive crops (peach, cherry, plum, grape, cowpea, onion, garlic, sweet potato, wheat, barley, sunflower, mung bean, sesame, lupin, strawberry, Jerusalem artichoke, kidney bean, lima bean). 6 mg/L is for tolerant crops (sorghum, tomato, alfalfa, purple vetch, parsley, red beet, sugar beet). 0.5 mg/L is for very sensitive crops (black- berry). 15 mg/L is for very tolerant crops (asparagus).
142. This value is for non−forage crops. A value of 0.01 mg/L is for forage crops grown in poorly drained soils, and a value of 0.02 mg/L is for forage crops grown in well drained soil.
143. The guideline for Zinc is dependent upon the pH of the soil, not the irrigation water. For Soil pH<6, the WQC is 1 mg/L. For soil pH greater than or equal to 6 and < 7, the WQC is 2. For soil pH greater then or equal to 7, the WQC is 5.
144. The listed value of 4 mg/L is for all livestock except long lived animals, such as dairy cows and breeding stock fed normal diets. A value of 2 mg/L is for all livestock fed high fluoride diets including mineral or bone meal and feed additives. A value of 1.5 mg/L is for dairy cows, breeding stock, and long−lived animals.
145. For livestock consuming forages not irrigated or if no molybdenum containing fertilizers are applied to grow the feed consumed by livestock, a value of 0.08 mg/L should be used.
146. When nitrate and nitrite are present, total nitrate plus nitrite−nitrogen should not exceed the nitrate WQG.
147. The listed value of 1 mg/L is for dairy cows, breeding stock, and long−lived animals and all animals fed high fluoride diets including mineral or bone meal and feed additives. 2 mg/L is for all livestock except for long lived animals, such as dairy cows and breeding stock fed normal diets.
148. Guideline applies to fish or shellfish consumed by wildlife.
149. The listed value of 6 mg/kg applies to bird eggs.
150. Resin acids are pH dependent. The listed value of 0.009 mg/L is valid between pH > 6.0 and <= 6.5. A value of 1 ug/L is valid at a pH of 5.0. A value of 3 ug/L is valid between a pH > 5.0 and <= 5.5. A value of 4 ug/L is valid between a pH > 5.5 and <=6.0. A value of 25 ug/L is valid between a pH > 6.5 and <= 7.0. A value of 45 ug/L is valid between a pH > 7.0 and <= 7.5. A value of 52 ug/L is valid between a pH > 7.5 and <= 8.0. A value of 60 ug/L is valid between a pH > 8.0 and <= 8.5. A value of 62 ug/L is valid between a pH > 8.5 and <= 9.0. Any pH less an 5.0 a site assessment may be necessary.
151. Dehydroabietic acid (DHA) is pH dependent. The listed value of 0.004 mg/L is valid between pH > 6.0 and<= 6.5. A value of 1 ug/L is valid at a pH of 5.0. A value of 2 ug/L is valid between a pH > 5.0 and <= 5.5. A value of 2 ug/L is valid between a pH > 5.5 and <=6.0. A value of 8 ug/L is valid between a pH > 6.5 and <= 7.0. A value of 12 ug/L is valid between a pH > 7.0 and <= 7.5. A value of 13 ug/L is valid between a pH > 7.5 and <= 8.0. A value of 14 ug/L is valid between a pH > 8.0 and <= 8.5. A value of 14 ug/L is valid between a pH > 8.5 and <= 9.0. Any pH less an 5.0 a site assessment may be necessary.
152. The benchmark can be greater than or equal to this value.
153. The value listed of 0.0011 mg/kg is the sum of compounds Aldrin and Dieldrin.
154. The value listed of 0.0052 mg/kg is the sum of compounds Heptachlor and Heptachlor epoxide.
155. The value listed of 0.021 mg/kg is the sum of Hexachlorocyclohexanes isomers.
156. The value listed of 0.25 mg/kg is the sum of Trichlorobenzenes isomers.
157. Hardness−dependent ambient water quality criterion (100 mg/L as CaCO3 used).
158. Value is for total of all chemical forms.
159. pH−dependent ambient water quality criterion (7.8 pH used).
160. These lowest effect levels are based on 10% of the screening level concentration instead of the default value of 5%.

161. These severe effect levels are based on 90% of the screening level concentration instead of the default value of the 95%.
162. Values are tentative guidelines.
163. Aluminum is pH dependent.
164. There is a duplicate row with higher values in the source.
165. Values are the same for Arsenic dissolved and Arsenic total recoverable.
166. Mercury dissolved value is listed. Total Recoverable value is 0.0034 mg/L.
167. The value listed is for Warm Water Habitat (WWH), Exceptional Warm Water Habitat (EWH), Modified Warm Water Habitat (MWH), Cold Water Habitat (CWH), and Limited Resource Water (LRW). For Seasonal Salmonid Habitat (SSH), no chlorine is to be discharged.
168. Mercury dissolved value is listed. Total Recoverable value is 0.0017 mg/L.
169. The value listed is for Warm Water Habitat (WWH), Exceptional Warm Water Habitat (EWH), Modified Warm Water Habitat (MWH), and Cold Water Habitat (CWH). For Seasonal Salmonid Habitat (SSH), no chlorine is to be discharged.
170. Mercury dissolved value is listed. Total Recoverable value is 0.00091 mg/L. Lake Erie Basin Total Recoverable value is 0.0000013 mg/L.
171. Selenium dissolved value is listed. Total Recoverable value is 0.005 mg/L.
172. The listed value is for Warm Water Habitat (WWH), Exceptional Warm Water Habitat (EWH), and Modified Warm Water Habitat (MWH).
173. The listed value is for Seasonal Salmonid Habitat (SSH) and Cold Water Habitat (CWH).
174. Ammonia's value is pH dependent. For Warm Water Habitat (WWH), Modified Warm Water Habitat (MWH), and Limited Resource Habitat (LRW), pH ranges between 6.5 − 7.7 with a temperature between 0C and 26C the value of 13 mg/L should be used. All other pH levels and temperatures should be referenced in Table 35−2. Link to the tables is here.
175. For Exceptional Warm Water Habitats (EWH) with a pH range of 6.5 − 7.4 and a temperature between 0C and 25C, the value of 13 mg/L should be used. All other pH levels and temperatures should be referenced in Table 35−3. Link to the tables is here.
176. For Cold Water Habitat (CWH) and Seasonal Salmonid Habitat (SSH) with a pH range of 6.5 − 7.4 and a temperature between 0C and 20C, the value of 13 mg/L should be used. All other pH levels and temperatures should be referenced in Table 35−4. Link to the tables is here.
177. Pentachlorophenol is pH dependent. The listed value of 0.011 mg/L is for a pH level of 7.5. For other pH levels, refer to Table 35−10. Link to the tables is here.
178. Cadmium is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35−9. Link to the tables is here.
179. Chromium is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35−9 here.
180. In addition, any whole sample of any representative aquatic organisms shall not exceed 0.64 mg/kg (wet weight).
181. Ammonia's value is pH dependent. For Warm Water Habitat (WWH) with pH ranges between 6.5 − 7.7 with a temperature between 10C and 14C, and during the months of March to November the value of 2.3 mg/L should be used. All other pH levels, temperatures, and months should be referenced in Table 35−5. Link to the tables is here.
182. Ammonia's value is pH dependent. For Exceptional Warm Water Habitats (EWM) with pH ranges between 6.5 - 7.7, a temperature between 10C and 13C, and during the months of March to November, the value of 2.2 mg/L should be used. All other pH levels, temperatures, and months should be referenced in Table 35−6. Link to the tables is here.
183. Ammonia's value is pH dependent. For Modified Warm Water Habitat (MWH) with pH ranges between 6.5 - 7.7, a temperature between 10C and 13C, and during the months of March to November, the value of 3.4 mg/L should be used. All other pH levels, temperatures, and months should be referenced in Table 35-7. Link to the tables is here.
184. Ammonia's value is pH dependent. For Cold Water Habitat (CWH) with pH ranges between 6.5 − 7.7 with a temperature between 8C and 13C, a value of 2.2 mg/L should be used. All other pH levels and temperatures should be referenced in Table 35-8. Link to the tables is here.
185. Copper is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35-9 here.
186. Lead is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35-9 here.
187. Nickel is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35-9 here.

188. Zinc is water hardness dependent. The listed value is for a water hardness of 100. For other hardness levels and forms, see Table 35−9 here.
189. This criterion applies to the sum of DDT and metabolites.
190. The form of the chemical is dissolved.
191. The form of the chemical is total recoverable.
192. The form of the chemical is total.
193. The form of the chemical is total residual.
194. The form of the Cyanide is free.
195. Values enclosed by ”( )” were not calculated according to the regulations, due to limited data. These values should only be used for advisory purposes, such as establishing ”reasonable potential”.
196. Values enclosed by ”[ ]” are national criteria and should be used for advisory purposes only.
197. Values are estimates.
198. Values are pH based.
199. Criterion is expressed as a function of the Water Effect Ratio (WER). For criterion in the table, WER equates to the default value of 1.0.
200. Dissolved criterion.
201. Criteria expressed as free cyanide (as CN)/L.
202. The value listed is calculated with an assumed hardness level of 100. To calculate additional hardness values, use the formulas provided in the document on page 34.
203. Westhollow Technical Center Levels were developed by Shell Oil for surface water and were approved for use by NJDEP with the following conditions: 1) the source area is removed, 2) these levels are on the fringe of the contamination area, and 3) active remediation is occurring. These levels are applicable to surface water and wetland areas.
204. The value listed is calculated with an assumed pH of 6.8 and temperature of 20C. For other values regarding various temperatures and pH levels, use the formulas provided in the document on page 33.
205. This value is for the total of Heptachlor/Heptachlor epoxide.
206. The benzene hexachloride (BHC) value applies to all stereoisomers of 1,2,3,4,5,6−hexachlorcyclohexane.
207. This value applies to all chlorinated dibenzofurans.
208. This value applies to all chlorinated dibenzo−p−dioxins.
209. Criteria for these metals are measured as total recoverable metal. However, they may be applied as dis- solved metals when, as part of a permit application, a dissolved metals translator has been established according to the procedures described in the document, ”Guidance for Establishing a Metal Translator”, Florida Department of Environmental Protection, December 17, 2001.
210. In the absence of concentration data specific for the III and VI valence states of chromium, total chromium concentrations in surface water should be compared to the criteria for Chromium (hexavalent).
211. These values were derived assuming soil pH 6.8. These leachability values are dependent upon both the metal concentration in soil and soil characteristics. Thus, if site−specific soil characteristics are different than the defaults, these leachability values may not apply. If this is the case, site−specific leachability values should be derived using methods such as TCLP or SPLP.
212. Phytotoxicity must be considered.
213. Unless concentrations for both chromium III and VI are known, total chromium concentrations should be compared with direct exposure SCTLs for chromium VI.
214. Expressed as dissolved.
215. Expressed as total recoverable.
216. Criteria do not apply to waters subject to water quality objectives in Tables III−2A and III−2B of the San Francisco Bay Regional Water Quality Control Board’s 1986 Basin Plan.
217. Criterion most appropriately applied to the sum of alpha−Endosulfan and beta−Endosulfan.
218. For nonchlorinated phenolic compounds.
219. For chlorinated phenolic compounds.
220. For benzene hexachloride isomers.
221. Value developed for chromium (VI); may be applied to total chromium if valence is unknown.
222. For the sum of alpha−Endosulfan, beta−Endosulfan, and Endosulfan sulfate.
223. Expressed as nitrogen.
224. For total chlorine residual.

225. For dissolved chloride associated with sodium; criterion probably will not be adequately protective when chloride is associated with potassium, calcium, or magnesium rather than sodium.
226. Expressed as free cyanide (as CN).
227. For pH between 6.5 and 9.0. Use of Water−Effects Ratios might be appropriate because: (1) aluminum is less toxic at higher pH and hardness but relationship not well quantified; (2) aluminum associated with clay particles may be less toxic than that associated with aluminum hydroxide particles; and (3) many high quality waters in U.S. exceed 87 ug/L as total or dissolved.
228. Applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).
229. Interim.
230. This value is for ruminant livestock. For non−ruminants, use 0.284
231. See the Ecological Soil Screening Level for Aluminum, Interim Final, OSWER Directive 9285.7-60, avail- able here
232. See the Ecological Soil Screening Level for Iron, Interim Final, OSWER Directive 9285.7-69, available here
233. The chronic freshwater−based and chronic tissue−based criteria are independently applicable and no one criterion takes primacy. The value here is for water. Other values are as follows: 0.000028 mg/kg wet weight for invertebrate whole−body tissue; 0.000201 mg/kg wet weight for fish whole−body tissue; and 0.000087 mg/kg wet weight for fish muscle tissue.
234. The chronic freshwater−based and chronic tissue−based criteria are independently applicable and no one criterion takes primacy. The value here is for water. Other values are as follows: 0.00108 mg/kg wet weight for invertebrate whole−body tissue; 0.00649 mg/kg wet weight for fish whole−body tissue; and 0.000133 mg/kg wet weight for fish muscle tissue.
235. pH 6.5−9.0
236. Criteria is for total dissolved form.
237. Freshwater criteria calculated using the EPA Biotic Ligand Model.
238. Cyanide measured as free cyanide at the lowest pH occurring in the receiving water or cyanide amenable to chlorination.
239. The one−hour average concentration of total ammonia nitrogen (in mg TAN/L) is not to exceed, more than once every three years on the average, the CMC (acute criterion magnitude) calculated using the following equation: CMC = MIN((0.275/(1+10ˆ(7.204−pH)))+(39/(1+10ˆ(pH−7.204)))), (0.7249*((0.0114/(1+10ˆ(7.204−pH)) +(1.6181/(1+10ˆ(pH−7.204)))*(23.12*10ˆ(0.036*(20−t))), where pH = pH of interest, t = temperature degrees Celsius.
240. The thirty−day rolling average concentration of total ammonia nitrogen (in mg TAN/L) is not to exceed, more than once every three years on the average, the chronic criterion magnitude (CCC) calculated using the following equation: CCC = 0.8876*((0.0278/(1+10ˆ(7.688−pH)))+(1.1994/(1+10ˆ(pH−7.688))))*(2.126*10ˆ(0.028*(20−MAX(T where pH = pH of interest, t = temperature degrees Celsius. In addition, the highest 4−day average within the 30−day averaging period should not be more than 2.5 times the CCC more than once in 3 years on average.
241. Value = EXPˆ(0.9789*LN(hardness)−3.866)*(1.136672−((LN(hardness)*(0.041838)))), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
242. Value = EXPˆ(0.7977*LN(hardness)−3.909)*(1.101672−((LN(hardness)*(0.041838)))), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
243. Value = 0.316*EXP(0.819*LN(hardness)+3.7256), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
244. Value = 0.86*EXP(0.819*LN(hardness)+0.6848), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
245. Value = (1.46203−LN(hardness)*0.145712)* EXP(1.273*LN(hardness)−1.460), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
246. Value = (1.46203−LN(hardness)*0.145712)* EXP(1.273*LN(hardness)−4.705), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
247. Value = 0.998*EXP(0.8460*LN(hardness)+2.255), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
248. Value = 0.997*EXP(0.8460*LN(hardness)+0.0584), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as CaCO3.
249. Value = EXP(1.005*pH−4.869), where EXP = e =2.71828, LN = natural log base e, and hardness is ex- pressed as mg/L as CaCO3.

250. Value = EXP(1.005*pH−5.134), where EXP = e =2.71828, LN = natural log base e, and hardness is ex- pressed as mg/L as $CaCO_3$.
251. Value = 0.85*EXP(1.72*LN(hardness)−6.59), where EXP = e =2.71828, LN = natural log base e, and hardness is expressed as mg/L as $CaCO_3$.

11. RADIONUCLIDE FOOTNOTES

1. Includes Barium-137
2. Includes Yittrium-90
3. Minimum ESL
4. Includes Plutonium-240