DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

Except as provided in ORS 469.525 and this division, a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except the site at which the radioactive material was used or generated according to a license under ORS 453.635 or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0010 - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in this division is to identify those materials that present such small health hazards that they are exempt from the provisions of ORS 469.525 and may be disposed of within the state.

(2) The rules in this division establish standards for the siting of facilities for disposal of wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities. Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0020 - Exempt Quantities

(1) Materials are exempt from provisions of ORS 469.525 if such materials contain radioactive material in individual quantities none of which exceeds the applicable quantity set forth in Table 2 and if the number of individual quantities does not exceed 10.

(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.300 & ORS 97.153

345-050-0025 - Exempt Concentrations

Materials are exempt from the provisions of ORS 469.525 provided that such materials contain radioactive materials in concentrations not in excess of those of Table 1**.**

Statutory/Other Authority: ORS 469
Statutes/Other Implemented: ORS 469.300, ORS 469.470 & ORS 469.525

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of rule 345-050-0006:

(1) Radioactive material that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.

(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.

(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.

(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.

(6) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.

(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.

(9) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0035 - Pathway Exemption

Naturally occurring radioactive materials are exempt from the provisions of OAR 345-050-0006 if the Council or the Department of Energy finds that accumulation of material cannot result in exposures exceeding 500 millirem of external gamma radiation per year, nor in the release of effluents to air and water in annual average concentrations exceeding the values in Table 3**.** The Council or the Department shall base its finding on an evaluation of potential radiation exposures and effluent releases performed under the following conditions:

(1) The evaluation considers material in the form in which it exists when it is removed from the users' equipment, systems, or settling ponds prior to any dilution or remedial action designed to reduce radiation levels.

(2) The evaluation does not consider any ameliorating effects of land use restrictions, maintenance operations, or cover material at the disposal site.

(3) The evaluation covers accumulations of material over the reasonably projected period of waste generation.

(4) The evaluation bases external gamma radiation exposures on actual measurement with allowance for the degree of equilibrium and for self-shielding.

(5) The evaluation uses the following premises in computing radon concentrations in the air above a disposal site containing radium-226:

(a) The evaluation assumes that any house built on ground contaminated with radium-226 has an 8-foot high ceiling on the first floor, has one complete air change per hour, and has a foundation constructed so as to meet the Structural Specialty Code (State of Oregon Uniform Building Code) in effect on March 1, 1979 without allowance for any special construction or treatments designed to reduce radon diffusion into the structure;

(b) The evaluation bases the relation between radon-emanation rate and radium concentration upon experimental measurements on material intended for disposal.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0036 - Gamma Pathway Exemption Interpretive Rule

(1) In determining compliance with OAR 345-050-0035 when considering external gamma radiation exposure, the Council or the Department of Energy must find that the disposal in Oregon of waste materials containing naturally-occurring radioactive materials (NORM) cannot result in doses to individuals greater than 500 millirem (mrem) per year. If doses could exceed this limit, the Council or the Department shall find that the waste material is radioactive and requires disposal in a licensed radioactive waste disposal site. To find the waste materials exempt, the Council or the Department must find that the waste materials meet air and water (including radon and leaching) pathway exemptions in OAR 345-050-0035. To determine compliance with the gamma pathway exemption in OAR 345-050-0035, the following conditions apply:

(a) "Waste material" means the annual solid waste stream leaving a site for landfill disposal.

(b) Actual field gamma radiation exposures are measured. The exposure readings are compared with the levels given in section (2) of this rule. The levels given in section (2) correspond to a potential

500 mrem dose per year. They are based on the dose a person might receive being 90 percent of the time in a house built on a homogeneous, semi-infinite plane (slab) of NORM assuming the house has a two-inch wooden floor over a two-foot crawl space and assuming exposure is measured at three feet above the floor. Computer modeling was used to correlate the radiation levels measured in the house to radiation from NORM in two container geometries -- a standard 55-gallon steel drum and a box measuring 1.5 x 1 x 2 feet (H x W x L).

(c) Readings are in microRoentgen per hour (uR/hr) using a detection system that is sensitive enough to determine compliance with the gamma radiation levels in section (2). Systems are calibrated according to National Institute of Standards and Technology (NIST) procedures with an NIST-traceable source, or equivalent calibration as judged by the Council Secretary. Measurements are made at a distance of one foot from the waste container. The contents of the container are proportional in composition to the average waste material. The highest reading measured around the container is used.

(2) The following readings correspond to a potential dose of 500 millirem per year for the respective container geometries. Long-lived radionuclides are assumed to be in secular equilibrium. If measurements as described in subsection (1)(c) of this rule produce readings below the following levels, the Council or the Department shall find the waste material is exempt based on the gamma pathway only:

(a) Standard 55-gallon steel drum: 18 uR/hr (above background) at one foot;

(b) Box (1.5H x 1W x 2L feet): 18 uR/hr (above background) at one foot.

(3) The Department may approve the use of exemption levels corresponding to container types other than those in section (2) to determine compliance if:

(a) The exemption levels for other container types are derived by the same computer model and assumptions used to calculate the exemption levels for the drum and the box in section (2);

(b) Measurements are made in compliance with subsections (1)(b) and (c);

(c) The contents of containers larger than a box or drum are uniformly mixed before readings are taken to determine compliance.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0038 - Water Pathway Exemption Interpretive Rule

(1) In determining compliance with OAR 345-050-0035 when considering release of effluents to water, the Council or the Department of Energy must find that the disposal in Oregon of waste materials containing naturally occurring radioactive materials (NORM) cannot result in effluents with annual average concentrations exceeding the values in Table 3 of this division. If effluent concentrations could exceed this limit, the Council or the Department shall find that the waste material is radioactive and require disposal in a licensed radioactive waste disposal site. To find the waste materials exempt, the Council or the Department must also find that the waste materials meet air and gamma (including radon

release) pathway exemptions in OAR 345-050-0035. To determine compliance with the water pathway exemption in OAR 345-050-0035, the following conditions apply:

(a) "Waste material" means the annual solid waste stream leaving a site for landfill disposal.

(b) At least four representative samples of the waste stream being evaluated must be tested using EPA Method 1312, "Synthetic precipitation leaching procedure" (SPLP). The resultant extractant must be analyzed for the radioactive constituents in the waste by a procedure of suitable accuracy and specificity that is approved by the Department.

(c) The results of the analysis of the extractant samples shall be compared to the values for concentrations in water above natural background shown in Table 3 of this division.

(2) The statistical results of the analyses of the SPLP extractants shall be reported to the Department.

(a) If the mean of the analytical results from the first sample set multiplied by a factor of 20 is greater than 50 percent of the value for the most restrictive isotope in Table 3 and the coefficient of variation (the standard deviation of the sample divided by the mean of the sample set) is greater than 0.25, an additional set of samples must be analyzed to better characterize the waste stream. This statistical evaluation and, if indicated, reanalysis must be made after each set of analyses. No more than 20 analyses are required to characterize the waste stream, but it must be shown that a good faith effort was made to analyze representative samples.

(b) If the mean of the analytical results from the first sample set multiplied by a factor of 20 is less than 50 percent of the value for the most restrictive isotope in Table 3, no further analyses are required.

(3) If the mean value from the analyses of the SPLP extractants for a single isotope multiplied by a factor of 20 exceeds the value in Table 3, the waste material is radioactive waste under Oregon law. If more than one radioactive isotope is present and the sum of the ratios of the individual concentrations of those isotopes multiplied by a factor of 20 to the values in Table 3 for those isotopes is greater than 1, the waste material is radioactive waste under Oregon law. See Note 1 in Table 3.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0040 - Standards for Waste Disposal Facilities

OAR 345-050-0040 through 345-050-0130 establish standards for disposal of radioactive waste. The Council shall apply the standards in deciding whether to issue a site certificate for the construction and operation of a waste disposal facility and its related or supporting facilities. If the Council adopts any additional standards, the Council shall do so sufficiently in advance of the close of testimony at a hearing on a site certificate to allow parties to address the standard or if after the close of testimony, in sufficient time to allow the parties an opportunity to supplement their testimony to offer evidence relating to the standard. The Council may use the standards established in OAR 345-050-0040 through 345-050-0130 and any standards adopted under this rule as well as other statutory and regulatory requirements of the Council and federal, state and local agencies in formulating site certificate conditions required by ORS 469.401.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525 & ORS 469.375

345-050-0050 - Definitions

The definitions set out in ORS 469.300 apply in interpreting these standards, unless the context requires otherwise or unless a term is specifically defined in this rule. Additional definitions are:

(1) "Area" means all locations adjacent to a facility determined by the Council to be directly affected by a force of nature to the eventual detriment of site integrity.

(2) "500-year flood plain" means the extent of a 500-year flood.

(3) "Active fault" means a fracture along which rocks or soil on one side have been displaced with respect to rocks or soil on the other side in Holocene time (i.e., the most recent epoch of the Quaternary period, extending from the end of Pleistocene to the present). "Active fault zone" means an area of one or more active faults.

(4) "Mass movement" means ground surface instabilities that result in land sliding, flow, creep or any other instabilities found by the Council to threaten the integrity of the facility.

(5) "Director" means the Director of the Oregon Department of Energy.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0055 - Mandatory Site Certificate Conditions

In addition to any other site certificate conditions the Council may impose under ORS 469.401, the Council shall impose site certificate conditions that require an applicant to design, build and operate a waste disposal facility in accordance with the design standards contained in OAR 345-050-060 and 345-050-0100 and in accordance with any representations the applicant makes in the plan submitted under OAR 345-050-0040 that address compliance with 345-050-0090, 345-050-0110, and 345-050-0130.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525 & ORS 469.375

345-050-0060 - Site Suitability

To issue a site certificate for a waste disposal facility, or to carry out a cooperative agreement or arrangement with an agency of the federal government to clean up radioactive waste, uranium mine overburden or contaminated material pursuant to ORS 469.559(2), the Council must find that the site is suitable for the type and amount of waste the applicant intends to dispose of at the site. For purposes of this rule, uranium mine overburden means earth and other material overlying natural deposits of uranium ore and removed to gain access to the ore, if disposal of the material would result in an exceedance of any of the pathways in OAR 345-050-0035 as in effect on the date of this rule. A site is not suitable if it is located in:

(1) An area determined by the Council to be subject to surface water erosion over the projected life of the facility. In making this determination, the Council shall consider geological evidence of historical

erosion, ancient shorelines, stream beds and cutting due to floods as well as impacts from future climate conditions.

(2) The 500-year flood plain of a river, stream or creek, taking into consideration the area the Council determines under section (1) to be potentially subject to erosion within the lifetime of the facility.

(3) A Quaternary-active fault or Quaternary-active fault zone.

(4) An area of ancient, recent, active or potentially active, mass movement or landslide, including the triggering mechanisms such as earthquake shaking.

(5) An area subject to volcanic damage over the past two-million years or that the Council finds to be subject to damage from natural forces of volcanic origin that is sufficient to cause meaningful degradation of facility integrity.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0070 - Alternate Site

A person shall not locate a waste disposal facility at a site unless there is no available alternative site for disposal of such wastes:

(1) A site outside of Oregon is not available unless appropriate local, state and federal regulatory agencies have issued the necessary permits to allow present commercial use of the site for disposal of wastes of the nature produced by the applicant.

(2) A site is not available unless the Council finds it to be the best site reasonably available for the disposal of such wastes. In making this finding, the Council may rely on a report of possible sites provided by the applicant. If the Director or the Council finds the list to be deficient, the Council may consider additional sites. The applicant may either perform the additional site evaluations itself or elect to have the Director perform them. The applicant shall reimburse the Director for all costs of site evaluations done by the Director.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0075 - Alternate Technology

A person shall not locate a waste disposal facility at a site unless there is no available alternative disposal technology that would better protect the health, safety, and welfare of the public and the environment. In making this finding, the Council shall consider proven, demonstrated technology, including but not limited to existing hazardous waste and radioactive waste disposal site technologies.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0090 - Adjacent State Compatibility

A person shall not locate a waste disposal facility at a site unless the person coordinates disposal of the type and amount of such wastes with the regulatory programs of adjacent states for disposal of such wastes. Coordination with the regulatory programs of adjacent states means that radioactive emissions from waste disposal facilities on or near Oregon boundaries comply with regulatory limits of the adjacent states.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0100 - Release of Radioactivity

(1) A person shall not locate a waste disposal facility at a site unless the facility is designed to contain radioactive releases. To issue a site certificate, the Council must find that the applicant has proposed to construct the site using methods that include, but are not limited to, construction of dikes, liners and covers, such that there can be no release of radioactive materials from the facility.

(2) To find that the proposed radioactive waste disposal facility is designed to contain radioactive releases, the Council shall consider measurements of natural background concentrations of radioactive materials near the facility. For the purpose of this rule, radioactive releases are contained if radiation levels and concentrations of radioactive materials are less than the upper statistical limit of background measurements measured before any waste is placed at the site. In making this finding, the Council shall consider statistical limits determined at the 99 percent confidence level.

(3) The applicant shall take samples to determine background from a minimum of four samples evenly spaced over a period of a year from each monitoring location of air, soil, groundwater and surface water. The applicant shall calculate the average of the measurements from each seasonal period and for each sample type to determine the background concentration. From year to year, the applicant may average the values to increase the statistical base of measurements, but only within the same seasonal period. The applicant shall use a sufficient number of monitoring locations to accurately characterize the area.

(4) After construction of the facility, the certificate holder shall determine compliance with release limits by statistically comparing the average of sample measurements to the upper limit of the range of background values. The certificate holder shall make this determination by comparing measurements from individual locations to the established background levels. The certificate holder may average multiple samples from the same location to determine compliance with release limits, but only within the same seasonal period.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0110 - Compatibility with Federal Programs

(1) A person shall not dispose of radioactive waste or uranium mine overburden at a site unless the disposal of the type and amount of such wastes is compatible with regulatory programs of the federal government for disposal of such wastes. Regulatory programs of the federal government refers to those programs that are formally adopted as federal laws or regulations but not to statements of policy or future intent.

(2) Commercial Disposal. To issue a site certificate, the Council must find that the disposal facility is designed to meet all applicable federal and state standards for disposal of the type of material involved.

(3) CERCLA Cleanup. If the project is a remedial action undertaken under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for hazardous substances as that term is defined in 42 USC 9601**,** the person responsible for cleanup shall also comply with the applicable portions of CERCLA, 42 USC 9601 et. seq**.:**

(a) If disposal will occur off-site, the person responsible for cleanup shall transfer the waste to a facility that is in compliance with any legally applicable federal and state requirements, including but not limited to, those required by sections 3004 and 3005 of the Solid Waste Disposal Act, 42 USC 6924 and 6925, and with the Toxic Waste Disposal Act, 15 USC 260**;**

(b) If the person responsible for cleanup proposes to construct a disposal facility in connection with an on-site cleanup of hazardous substances, the the person responsible for cleanup must comply with those portions of OAR 345 Divisions 50, 92 and 95 that are legally applicable or relevant and appropriate under the circumstances of the release or threatened release except as provided in 42 USC Section 9621(d)(4)**.**

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0120 - Bonding and Financial Ability

(1) A person shall not locate a waste disposal facility at a site unless, if federal funding for remedial actions is not available, the applicant provides a surety bond in the name of the state in an amount determined by the Oregon Department of Energy to be sufficient to cover any costs of closing the site and monitoring it or providing for its security after closure and to secure performance of any site certificate condition.

(2) The applicant shall estimate the cost of closing the site, including the cost of the effort to comply with the site suitability requirements of OAR 345-050-0060 and the radioactive release limits of OAR 345-050-0100. To determine the cost of monitoring the site, providing for its security after closure and, in the case of a facility with a site certificate, ensuring performance of site certificate conditions, the applicant shall base the estimate on the amount of investment principal that would be required to produce proceeds sufficient to provide for the cost of quarterly visits to the plant site by state regulatory agencies for inspections and environmental sampling.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

345-050-0130 - Ability to Construct and Operate

A person shall not locate a waste disposal facility at a site unless the person or firm proposing to dispose of the material has or can acquire the organizational, managerial, and technical expertise to construct, operate and retire the facility.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.375

DIVISION 50

Table 1
EXEMPT CONCENTRATIONS

(See notes at the end of this table.)

Element (atomic number)	Isotope	Liquid and Solid Concentration (uCi/ml for liquids) (µCi/gm for solids)
Aluminum (13)	Al-26	$4x10^{-4}$
Americium (95)	Am-241	$8x10^{-7}$
Antimony (51)	Sb-122	$3x10^{-4}$
	Sb-124	$2x10^{-4}$
	Sb-125	$1x10^{-3}$
	Sb-126	$6x10^{-4}$
Arsenic (33)	As-73	$5x10^{-3}$
	As-74	$5x10^{-4}$
	As-76	$2x10^{-4}$
	As-77	$8x10^{-4}$
Barium (56)	Ba-131	$2x10^{-3}$
	Ba-133	$2x10^{-3}$
	Ba-140	$3x10^{-4}$
Beryllium (4)	Be-7	$2x10^{-2}$
Bismuth (83)	Bi-206	$4x10^{-4}$
Bromine (35)	Br-82	$3x10^{-3}$
Cadmium (48)	Cd-109	$2x10^{-3}$
	Cd-115m	$3x10^{-4}$
	Cd-115	$3x10^{-4}$
Calcium (20)	Ca-41	$3x10^{-3}$
	Ca-45	$9x10^{-5}$
	Ca-47	$5x10^{-4}$
Carbon (6)	C-14	$8x10^{-3}$
Cerium (58)	Ce-141	$9x10^{-4}$
	Ce-143	$4x10^{-4}$
	Ce-144	$1x10^{-4}$
Cesium (55)	Cs-131	$2x10^{-2}$
	Cs-134m	$6x10^{-2}$
	Cs-134	$9x10^{-5}$
	Cs-137	$1x10^{-4}$
Chlorine (17)	Cl-36	$2x10^{-3}$
	Cl-38	$4x10^{-3}$
Chromium (24)	Cr-51	$2x10^{-2}$
Cobalt (27)	Co-57	$5x10^{-3}$
	Co-58	$1x10^{-3}$

Element (atomic number)	Isotope	Liquid and Solid Concentration (uCi/ml for liquids) (µCi/gm for solids)
	Co-60	$5x10^{-4}$
Copper (29)	Cu-64	$3x10^{-3}$
Curium (96)	Cm-242	$3x10^{-5}$
	Cm-243	$1x10^{-6}$
	Cm-244	$1x10^{-6}$
Dysprosium (66)	Dy-165	$4x10^{-3}$
	Dy-166	$4x10^{-4}$
Erbium (68)	Er-169	$9x10^{-4}$
	Er-171	$1x10^{-3}$
Europium (63)	Eu-152 (9.2 h)	$6x10^{-4}$
	Eu-152 (12 yr)	$8x10^{-4}$
	Eu-154	$5x10^{-4}$
	Eu-155	$2x10^{-3}$
Fluorine (9)	F-18	$8x10^{-3}$
Gadolinium (64)	Gd-153	$2x10^{-3}$
	Gd-159	$8x10^{-4}$
Gallium (31)	Ga-67	$7x10^{-3}$
	Ga-72	$4x10^{-4}$
Germanium (32)	Ge-71	$2x10^{-2}$
Gold (79)	Au-195	$5x10^{-3}$
	Au-196	$2x10^{-3}$
	Au-198	$5x10^{-4}$
	Au-199	$2x10^{-3}$
Hafnium (72)	Hf-181	$7x10^{-4}$
Hydrogen (1)	H-3	$3x10^{-2}$
Indium (49)	In-111	$8x10^{-2}$
	In-113m	$1x10^{-2}$
	In-114m	$2x10^{-4}$
Iodine (53)	I-125	$2x10^{-5}$
	I-126	$2x10^{-5}$
	I-129	$5x10^{-6}$
	I-131	$2x10^{-5}$
	I-132	$6x10^{-4}$
	I-133	$7x10^{-5}$
	I-134	$1x10^{-3}$
Iridium (77)	Ir-190	$2x10^{-3}$
	Ir-192	$4x10^{-4}$
	Ir-194	$3x10^{-4}$
Iron (26)	Fe-55	$8x10^{-3}$
	Fe-59	$6x10^{-4}$

Element (atomic number)	Isotope	Liquid and Solid Concentration (uCi/ml for liquids) (µCi/gm for solids)
Lanthanum (57)	La-140	$2x10^{-4}$
Lead (82)	Pb-203	$4x10^{-3}$
Lutetium (71)	Lu-177	$1x10^{-3}$
Manganese (25)	Mn-52	$3x10^{-4}$
	Mn-54	$1x10^{-3}$
	Mn-56	$1x10^{-3}$
Mercury (80)	Hg-197m	$2x10^{-3}$
	Hg-197	$3x10^{-3}$
	Hg-203	$2x10^{-4}$
Molybdenum (42)	Mo-99	$2x10^{-3}$
Neodymium (60)	Nd-147	$6x10^{-4}$
	Nd-149	$3x10^{-3}$
Nickel (28)	Ni-59	$2x10^{-2}$
	Ni-63	$9x10^{-3}$
	Ni-65	$1x10^{-3}$
Niobium (41) (Columbium)	Nb-94	$9x10^{-4}$
	Nb-95	$1x10^{-3}$
	Nb-97	$9x10^{-3}$
Osmium (76)	Os-185	$7x10^{-4}$
	Os-191m	$3x10^{-2}$
	Os-191	$2x10^{-3}$
	Os-193	$6x10^{-4}$
Palladium (46)	Pd-103	$3x10^{-3}$
	Pd-109	$9x10^{-4}$
Phosphorus (15)	P-32	$2x10^{-4}$
	P-33	$6x10^{-3}$
Platinum (78)	Pt-191	$1x10^{-3}$
	Pt-193m	$1x10^{-2}$
	Pt-197m	$1x10^{-2}$
	Pt-197	$1x10^{-3}$
Plutonium (94)	Pu-238	$9x10^{-7}$
	Pu-239	$8x10^{-7}$
	Pu-240	$8x10^{-7}$
	Pu-241	$4x10^{-5}$
	Pu-242	$8x10^{-7}$
Potassium (19)	K-42	$3x10^{-3}$
Praseodymium (59)	Pr-142	$3x10^{-4}$
	Pr-143	$5x10^{-4}$
Promethium (61)	Pm-147	$2x10^{-3}$
	Pm-149	$4x10^{-4}$

Element (atomic number)	Isotope	Liquid and Solid Concentration (uCi/ml for liquids) (µCi/gm for solids)
Rhenium (75)	Re-183	$6x10^{-3}$
	Re-186	$9x10^{-4}$
	Re-188	$6x10^{-4}$
Rhodium (45)	Rh-103m	$1x10^{-1}$
	Rh-105	$1x10^{-3}$
Rubidium (37)	Rb-86	$7x10^{-4}$
Ruthenium (44)	Ru-97	$4x10^{-3}$
	Ru-103	$8x10^{-4}$
	Ru-105	$1x10^{-3}$
	Ru-106	$1x10^{-4}$
Samarium (62)	Sm-153	$8x10^{-4}$
Scandium (21)	Sc-46	$4x10^{-4}$
	Sc-47	$9x10^{-4}$
	Sc-48	$3x10^{-4}$
Selenium (34)	Se-75	$3x10^{-3}$
Silicon (14)	Si-31	$9x10^{-3}$
Silver (47)	Ag-105	$1x10^{-3}$
	Ag-108m	$6x10^{-4}$
	Ag-110m	$3x10^{-4}$
	Ag-111	$4x10^{-4}$
Sodium (11)	Na-22	$4x10^{-4}$
	Na-24	$2x10^{-3}$
Strontium (38)	Sr-85	$1x10^{-3}$
	Sr-89	$1x10^{-4}$
	Sr-90	$3x10^{-5}$
	Sr-91	$7x10^{-4}$
	Sr-92	$7x10^{-4}$
Sulfur (16)	S-35	$6x20^{-4}$
Tantalum (73)	Ta-182	$4x10^{-4}$
Technetium (43)	Tc-96m	$1x10^{-1}$
	Tc-96	$1x10^{-3}$
	Tc-99m	$8x10^{-2}$
	Tc-99	$4x10^{-3}$
Tellurium (52)	Te-125m	$2x10^{-3}$
	Te-127m	$6x10^{-4}$
	Te-127	$3x10^{-3}$
	Te-129m	$3x10^{-4}$
	Te-131m	$6x10^{-4}$
	Te-132	$3x10^{-4}$
Terbium (65)	Tb-160	$4x10^{-4}$
Thallium (81)	Tl-200	$4x10^{-3}$

Element (atomic number)	Isotope	Liquid and Solid Concentration (uCi/ml for liquids) (µCi/gm for solids)
	Tl-201	$3x10^{-3}$
	Tl-202	$1x10^{-3}$
	Tl-204	$1x10^{-3}$
Thulium (69)	Tm-170	$5x10^{-4}$
	Tm-171	$5x10^{-3}$
Tin (50)	Sn-113	$9x10^{-4}$
	Sn-125	$2x10^{-4}$
Tungsten (74)	W-181	$4x10^{-3}$
	W-187	$7x10^{-4}$
Uranium (92)	U-233	$1x10^{-5}$
	U-234	$1x10^{-5}$
	U-235	$1x10^{-5}$
	U-236	$1x10^{-5}$
	U-238	$1x10^{-5}$
Vanadium (23)	V-48	$3x10^{-4}$
Ytterbium (70)	Yb-175	$1x10^{-3}$
Yttrium (39)	Y-90	$2x10^{-4}$
	Y-91m	$3x10^{-2}$
	Y-91	$3x10^{-4}$
	Y-92	$6x10^{-4}$
	Y-93	$3x10^{-4}$
Zinc (30)	Zn-65	$1x10^{-3}$
	Zn-69m	$7x10^{-4}$
	Zn-69	$2x10^{-2}$
Zirconium (40)	Zr-95	$6x10^{-4}$
	Zr-97	$2x10^{-4}$
Beta- and/or gamma-emitting radioactive material not listed above with half-life of less than 3 years.		$1x10^{-6}$
Beta- and/or gamma-emitting radioactive material other than naturally occurring radioactive material not listed above with half-life of equal to or more than 3 years.		$5x10^{-7}$
Alpha-emitting radioactive material other than naturally occurring radioactive material not listed above with a half-life of less than 3 years.		$3x10^{-7}$
Alpha-emitting radioactive material other than naturally occurring radioactive material not listed above with a half-life of equal to or more than 3 years.		$1x10^{-7}$

Note 1: Many radioisotopes transform into isotopes that are also radioactive. In expressing the concentrations in Table 1, the activity stated is that of the parent isotope and takes into account the daughters.

Note 2: For purposes of OAR 345-050-0025, where a combination of isotopes is involved, the limit for the combination should be derived as follows:

Determine for each isotope in the product the ratio between the radioactivity concentration present in the product and the exempt radioactivity concentration established in Table 1 for the specific isotope when not in combination. The sum of such ratios must not exceed "1".

Example:

$$\frac{\text{Concentration of Isotope A in Product}}{\text{Exempt Concentration of Isotope A}} + \frac{\text{Concentration of Isotope B in Product}}{\text{Exempt Concentration of Isotope B}} \leq 1$$

DIVISION 50

Table 2
EXEMPT QUANTITIES

Radioactive Material	Microcuries
Antimony-122 (Sb 122)	100
Antimony-124 (Sb 124)	10
Antimony-125 (Sb 125)	10
Arsenic-73 (As 73)	100
Arsenic-74 (As 74)	10
Arsenic-76 (As 76)	10
Arsenic-77 (As 77)	100
Barium-131 (Ba 131)	10
Barium-133 (Ba 133)	10
Barium-140 (Ba 140)	10
Bismuth-210 (Bi 210)	1
Bromine-82 (Br 82)	10
Cadmium-109 (Cd 109)	10
Cadmium-115m (Cd 115m)	10
Cadmium-115 (Cd 115)	100
Calcium-45 (Ca 45)	10
Calcium-47 (Ca 47)	10
Carbon-14 (C 14)	100
Cerium-141 (Ce 141)	100
Cerium-143 (Ce 143)	100
Cerium-144 (Ce 144)	1
Cesium-129 (Cs 129)	100
Cesium-131 (Cs 131)	1,000
Cesium-134m (Cs 134m)	100
Cesium-134 (Cs 134)	1
Cesium-135 (Cs 135)	10
Cesium-136 (Cs 136)	10
Cesium-137 (Cs 137)	10
Chlorine-36 (Cl 36)	10
Chlorine-38 (Cl 38)	10
Chromium-51 (Cr 51)	1,000
Cobalt-57 (Co 57)	100
Cobalt-58m (Co 58m)	10
Cobalt-58 (Co 58)	10
Cobalt-60 (Co 60)	1
Copper-64 (Cu 64)	100
Dysprosium-165 (Dy 165)	10

Radioactive Material	Microcuries
Dysprosium-166 (Dy 166)	100
Erbium-169 (Er 169)	100
Erbium-171 (Er 171)	100
Europium-152 (Eu 152) 9.2h	100
Europium-152 (Eu 152) 13 yr	1
Europium-154 (Eu 154)	1
Europium-155 (Eu 155)	10
Fluorine-18 (F 18)	1,000
Gadolinium-153 (Gd 153)	10
Gadolinium-159 (Gd 159)	100
Gallium-67 (Ga 67)	100
Gallium-72 (Ga 72)	10
Germanium-68 (Ge 68)	10
Germanium-71 (Ge 71)	100
Gold-195 (Au 195)	10
Gold-198 (Au 198)	100
Gold-199 (Au 199)	100
Hafnium-181 (Hf 181)	10
Holmium-166 (Ho 166)	100
Hydrogen-3 (H 3)	1,000
Indium-111 (In 111)	100
Indium-113m (In 113m)	100
Indium-114m (In 114m)	10
Indium-115m (In 115m)	100
Indium-115 (In 115)	10
Iodine-123 (I-123)	100
Iodine-125 (I-125)	1
Iodine-126 (I-126)	1
Iodine-129 (I-129)	0.1
Iodine-131 (I-131)	1
Iodine-132 (I-132)	10
Iodine-133 (I-133)	1
Iodine-134 (I-134)	10
Iodine-135 (I-135)	10
Iridium-192 (Ir 192)	10
Iridium-194 (Ir 194)	100
Iron-52 (Fe 52)	10
Iron-55 (Fe 55)	100
Iron-59 (Fe 59)	10
Krypton-85 (Kr 85)	100

Radioactive Material	Microcuries
Krypton-87 (Kr 87)	10
Lanthanum-140 (La 140)	10
Lutetium-177 (Lu 177)	100
Manganese-52 (Mn 52)	10
Manganese-54 (Mn 54)	10
Manganese-56 (Mn 56)	10
Mercury-197m (Hg 197m)	100
Mercury-197 (Hg 197)	100
Mercury-203 (Hg 203)	10
Molybdenum-99 (Mo 99)	100
Neodymium-147 (Nd 147)	100
Neodymium-149 (Nd 149)	100
Nickel-59 (Ni 59)	100
Nickel-63 (Ni 63)	10
Nickel-65 (Ni 65)	100
Niobium-93m (Nb 93m)	10
Niobium-95 (Nb 95)	10
Niobium-97 (Nb 97)	10
Osmium-185 (Os 185)	10
Osmium-191m (Os 191m)	100
Osmium-191 (Os 191)	100
Osmium-193 (Os 193)	100
Palladium-103 (Pd 103)	100
Palladium-109 (Pd 109)	100
Phosphorus-32 (P 32)	10
Platinum-191 (Pt 191)	100
Platinum-193m (Pt 193m)	100
Platinum-193 (Pt 193)	100
Platinum-197m (Pt 197m)	100
Platinum-197 (Pt 197)	100
Polonium-210 (Po 210)	0.1
Potassium-42 (K 42)	10
Potassium-43 (K 43)	10
Praseodymium-142 (Pr 142)	100
Praseodymium-143 (Pr 143)	100
Promethium-147 (Pm 147)	10
Promethium-149 (Pm 149)	10
Rhenium-186 (Re 186)	100
Rhenium-188 (Re 188)	100
Rhodium-103m (Rh 103m)	100

Radioactive Material	Microcuries
Rhodium-105 (Rh 105)	100
Rubidium-81 (Rb 81)	10
Rubidium-86 (Rb 86)	10
Rubidium-87 (Rb 87)	10
Ruthenium-97 (Ru 97)	100
Ruthenium-103 (Ru 103)	10
Ruthenium-105 (Ru 105)	10
Ruthenium-106 (Ru 106)	1
Samarium-151 (Sm 151)	10
Samarium-153 (Sm 153)	100
Scandium-46 (Sc 46)	10
Scandium-47 (Sc 47)	100
Scandium-48 (Sc 48)	10
Selenium-75 (Se 75)	10
Silicon-31 (Si 31)	100
Silver-105 (Ag 105)	10
Silver-110m (Ag 110m)	1
Silver-111 (Ag 111)	100
Sodium-22 (Na 22)	10
Sodium-24 (Na 24)	10
Strontium-85 (Sr 85)	10
Strontium-89 (Sr 89)	1
Strontium-90 (Sr 90)	0.1
Strontium-91 (Sr 91)	10
Strontium-92 (Sr 92)	10
Sulphur-35 (S 35)	100
Tantalum-182 (Ta 182)	10
Technetium-96 (Tc 96)	10
Technetium-97m (Tc 97m)	100
Technetium-97 (Tc 97)	100
Technetium-99m (Tc 99m)	100
Technetium-99 (Tc 99)	10
Tellurium-125m (Te 125m)	10
Tellurium-127m (Te 127m)	10
Tellurium-127 (Te 127)	100
Tellurium-129m (Te 129m)	10
Tellurium-129 (Te 129)	100
Tellurium-131m (Te 131m)	10
Tellurium-132 (Te 132)	10
Terbium-160 (Tb 160)	10

Radioactive Material	Microcuries
Thallium-200 (Tl 200)	100
Thallium-201 (Tl 201)	100
Thallium-202 (Tl 202)	100
Thallium-204 (Tl 204)	10
Thulium-170 (Tm 170)	10
Thulium-171 (Tm 171)	10
Tin-113 (Sn 113)	10
Tin-125 (Sn 125)	10
Tungsten-181 (W 181)	10
Tungsten-185 (W 185)	10
Tungsten-187 (W 187)	100
Vanadium-48 (V 48)	10
Xenon-131m (Xe 131m)	1,000
Xenon-133 (Xe 133)	100
Xenon-135 (Xe 135)	100
Ytterbium-175 (Yb 175)	100
Yttrium-87 (Y 87)	10
Yttrium-88 (Y 88)	10
Yttrium-90 (Y 90)	10
Yttrium-91 (Y 91)	10
Yttrium-92 (Y 92)	100
Yttrium-93 (Y 93)	100
Zinc-65 (Zn 65)	10
Zinc-69m (Zn 69m)	100
Zinc-69 (Zn 69)	1,000
Zirconium-93 (Zr 93)	10
Zirconium-95 (Zr 95)	10
Zirconium-97 (Zr 97)	10
Any radioactive material not listed above other than alpha-emitting radioactive material.	0.1
Any alpha-emitting radioactive material other than naturally occurring radioactive material not listed above	0.05

DIVISION 50

Table 3
CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

(See Note at the end of this table.)

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
Actinium (89)	Ac-227	S	$8x10^{-14}$	$2x10^{-6}$
		I	$9x10^{-13}$	$3x10^{-4}$
	Ac-228	S	$3x10^{-9}$	$9x10^{-5}$
		I	$6x10^{-10}$	$9x10^{-5}$
Americium (95)	Am-241	S	$2x10^{-13}$	$4x10^{-6}$
		I	$4x10^{-12}$	$3x10^{-5}$
	Am-242m	S	$2x10^{-13}$	$4x10^{-6}$
		I	$9x10^{-12}$	$9x10^{-5}$
	Am-242	S	$1x10^{-9}$	$1x10^{-4}$
		I	$2x10^{-9}$	$1x10^{-4}$
	Am-243	S	$2x10^{-13}$	$4x10^{-6}$
		I	$4x10^{-12}$	$3x10^{-5}$
	Am-244	S	$1x10^{-7}$	$5x10^{-3}$
		I	$8x10^{-7}$	$5x10^{-3}$
Antimony (51)	Sb-122	S	6x10-9	$3x10^{-5}$
		I	5x10-9	$3x10^{-5}$
	Sb-124	S	5x10-9	$2x10^{-5}$
		I	7x10-10	$2x10^{-5}$
	Sb-125	S	2x10-8	$1x10^{-4}$
		I	9x10-10	$1x10^{-4}$
Argon (18)	Ar-37	Sub	$1x10^{-4}$	—
	Ar-41	Sub	$4x10^{-8}$	—
Arsenic (33)	As-73	S	$7x10^{-8}$	$5x10^{-4}$
		I	$1x10^{-8}$	$5x10^{-4}$
	As-74	S	$1x10^{-8}$	$5x10^{-5}$
		I	$4x10^{-9}$	$5x10^{-5}$
	As-76	S	$4x10^{-9}$	$2x10^{-5}$
		I	$3x10^{-9}$	$2x10^{-5}$
	As-77	S	$2x10^{-8}$	$8x10^{-5}$
		I	$1x10^{-8}$	$8x10^{-5}$
Astatine (85)	At-211	S	$2x10^{-10}$	$2x10^{-6}$
		I	$1x10^{-9}$	$7x10^{-5}$
Barium (56)	Ba-131	S	$4x10^{-8}$	$2x10^{-4}$
		I	$1x10^{-8}$	$2x10^{-4}$
	Ba-140	S	$4x10^{-9}$	$3x10^{-5}$
		I	$1x10^{-9}$	$2x10^{-5}$
Berkelium (97)	Bk-249	S	$3x10^{-11}$	$6x10^{-4}$
		I	$4x10^{-9}$	$6x10^{-4}$
	Bk-250	S	$5x10^{-9}$	$2x10^{-4}$
		I	$4x10^{-8}$	$2x10^{-4}$

Element (Atomic Number)	Isotope†		Column 1: Air (μCi/ml)	Column 2: Water (μCi/ml)
Beryllium (4)	Be-7	S	$2x10^{-7}$	$2x10^{-3}$
		I	$4x10^{-8}$	$2x10^{-3}$
Bismuth (83)	Bi-206	S	$6x10^{-9}$	$4x10^{-5}$
		I	$5x10^{-9}$	$4x10^{-5}$
	Bi-207	S	$6x10^{-9}$	$6x10^{-5}$
		I	$5x10^{-10}$	$6x10^{-5}$
	Bi-210	S	$2x10^{-10}$	$4x10^{-5}$
		I	$2x10^{-10}$	$4x10^{-5}$
	Bi-212	S	$3x10^{-9}$	$4x10^{-4}$
		I	$7x10^{-9}$	$4x10^{-4}$
Bromine (35)	Br-82	S	$4x10^{-8}$	$3x10^{-4}$
		I	$6x10^{-9}$	$4x10^{-5}$
Cadmium (48)	Cd-109	S	$2x10^{-9}$	$2x10^{-4}$
		I	$3x10^{-9}$	$2x10^{-4}$
	Cd-115m	S	$1x10^{-9}$	$3x10^{-5}$
		I	$1x10^{-9}$	$3x10^{-5}$
	Cd-115	S	$8x10^{-9}$	$3x10^{-5}$
		I	$6x10^{-9}$	$4x10^{-5}$
Calcium (20)	Ca-45	S	$1x10^{-9}$	$9x10^{-6}$
		I	$4x10^{-9}$	$2x10^{-4}$
	Ca-47	S	$6x10^{-9}$	$5x10^{-5}$
		I	$6x10^{-9}$	$3x10^{-5}$
Californium (98)	Cf-249	S	$5x10^{-14}$	$4x10^{-6}$
		I	$3x10^{-12}$	$2x10^{-5}$
	Cf-250	S	$2x10^{-13}$	$1x10^{-5}$
		I	$3x10^{-12}$	$3x10^{-5}$
	Cf-251	S	$6x10^{-14}$	$4x10^{-6}$
		I	$3x10^{-12}$	$3x10^{-5}$
	Cf-252	S	$2x10^{-13}$	$7x10^{-6}$
		I	$1x10^{-12}$	$7x10^{-6}$
	Cf-253	S	$3x10^{-11}$	$1x10^{-4}$
		I	$3x10^{-11}$	$1x10^{-4}$
	Cf-254	S	$2x10^{-13}$	$1x10^{-7}$
		I	$2x10^{-13}$	$1x10^{-7}$
Carbon (6)	C-14	S	$1x10^{-7}$	$8x10^{-4}$
	(CO2)	Sub	$1x10^{-6}$	—
Cerium (58)	Ce-141	S	$2x10^{-8}$	$9x10^{-5}$
		I	$5x10^{-9}$	$9x10^{-5}$
	Ce-143	S	$9x10^{-9}$	$4x10^{-5}$
		I	$7x10^{-9}$	$4x10^{-5}$
	Ce-144	S	$3x10^{-10}$	$1x10^{-5}$
		I	$2x10^{-10}$	$1x10^{-5}$
Cesium (55)	Cs-131	S	$4x10^{-7}$	$2x10^{-3}$
		I	$1x10^{-7}$	$9x10^{-4}$
	Cs-134m	S	$1x10^{-6}$	$6x10^{-3}$
		I	$2x10^{-7}$	$1x10^{-3}$
	Cs-134	S	$1x10^{-9}$	$9x10^{-6}$
		I	$4x10^{-10}$	$4x10^{-5}$

Element (Atomic Number)	Isotope†		Column 1: Air (μCi/ml)	Column 2: Water (μCi/ml)
	Cs-135	S	$2x10^{-8}$	$1x10^{-4}$
		I	$3x10^{-9}$	$2x10^{-4}$
	Cs-136	S	$1x10^{-8}$	$9x10^{-5}$
		I	$6x10^{-9}$	$6x10^{-5}$
	Cs-137	S	$2x10^{-9}$	$2x10^{-5}$
		I	$5x10^{-10}$	$4x10^{-5}$
Chlorine (17)	Cl-36	S	$1x10^{-8}$	$8x10^{-5}$
		I	$8x10^{-10}$	$6x10^{-5}$
	Cl-38	S	$9x10^{-8}$	$4x10^{-4}$
		I	$7x10^{-8}$	$4x10^{-4}$
Chromium (24)	Cr-51	S	$4x10^{-7}$	$2x10^{-3}$
		I	$8x10^{-8}$	$2x10^{-3}$
Cobalt (27)	Co-57	S	$1x10^{-7}$	$5x10^{-4}$
		I	$6x10^{-9}$	$4x10^{-4}$
	Co-58m	S	$6x10^{-7}$	$3x10^{-3}$
		I	$3x10^{-7}$	$2x10^{-3}$
	Co-58	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-9}$	$9x10^{-5}$
	Co-60	S	$1x10^{-8}$	$5x10^{-5}$
		I	$3x10^{-10}$	$3x10^{-5}$
Copper (29)	Cu-64	S	$7x10^{-8}$	$3x10^{-4}$
		I	$4x10^{-8}$	$2x10^{-4}$
Curium (96)	Cm-242	S	$4x10^{-12}$	$2x10^{-5}$
		I	$6x10^{-12}$	$2x10^{-5}$
	Cm-243	S	$2x10^{-13}$	$5x10^{-6}$
		I	$3x10^{-12}$	$2x10^{-5}$
	Cm-244	S	$3x10^{-13}$	$7x10^{-6}$
		I	$3x10^{-12}$	$3x10^{-5}$
	Cm-245	S	$2x10^{-13}$	$4x10^{-6}$
		I	$4x10^{-12}$	$3x10^{-5}$
	Cm-246	S	$2x10^{-13}$	$4x10^{-6}$
		I	$4x10^{-12}$	$3x10^{-5}$
	Cm-247	S	$2x10^{-13}$	$4x10^{-6}$
		I	$4x10^{-12}$	$2x10^{-5}$
	Cm-248	S	$2x10^{-14}$	$4x10^{-7}$
		I	$4x10^{-13}$	$1x10^{-6}$
	Cm-249	S	$4x10^{-7}$	$2x10^{-3}$
		I	$4x10^{-7}$	$2x10^{-3}$
Dysprosium (66)	Dy-165	S	$9x10^{-8}$	$4x10^{-4}$
		I	$7x10^{-8}$	$4x10^{-4}$
	Dy-166	S	$8x10^{-9}$	$4x10^{-5}$
		I	$7x10^{-9}$	$4x10^{-5}$
Einsteinium (99)	Es-253	S	$3x10^{-11}$	$2x10^{-5}$
		I	$2x10^{-11}$	$2x10^{-5}$
	Es-254m	S	$2x10^{-10}$	$2x10^{-5}$
		I	$2x10^{-10}$	$2x10^{-5}$
	Es-254	S	$6x10^{-13}$	$1x10^{-5}$
		I	$4x10^{-12}$	$1x10^{-5}$

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
	Es-255	S	2x10^{-11}	3x10^{-5}
		I	1x10^{-11}	3x10^{-5}
Erbium (68)	Er-169	S	2x10^{-8}	9x10^{-5}
		I	1x10^{-8}	9x10^{-5}
	Er-171	S	2x10^{-8}	1x10^{-4}
		I	2x10^{-8}	1x10^{-4}
Europium (63)	Eu-152	S	1x10^{-8}	6x10^{-5}
	(Tr=9.2 hrs)		1x10^{-8}	6x10^{-5}
	Eu-152	S	4x10^{-10}	8x10^{-5}
	(Tr=13 yrs)		6x10^{-10}	8x10^{-5}
	Eu-154	S	1x10^{-10}	2x10^{-5}
		I	2x10^{-10}	2x10^{-5}
	Eu-155	S	3x10^{-9}	2x10^{-4}
		I	3x10^{-9}	2x10^{-4}
Fermium (100)	Fm-254	S	2x10^{-9}	1x10^{-4}
		I	2x10^{-9}	1x10^{-4}
	Fm-255	S	6x10^{-10}	3x10^{-5}
		I	4x10^{-10}	3x10^{-5}
	Fm-256	S	1x10^{-10}	9x10^{-7}
		I	6x10^{-11}	9x10^{-7}
Fluorine (9)	F-18	S	2x10^{-7}	8x10^{-4}
		I	9x10^{-8}	5x10^{-4}
Gadolinium (64)	Gd-153	S	8x10^{-9}	2x10^{-4}
		I	3x10^{-9}	2x10^{-4}
	Gd-159	S	2x10^{-8}	8x10^{-5}
		I	1x10^{-8}	8x10^{-5}
Gallium (31)	Ga-72	S	8x10^{-9}	4x10^{-5}
		I	6x10^{-9}	4x10^{-5}
Germanium (32)	Ge-71	S	4x10^{-7}	2x10^{-3}
		I	2x10^{-7}	2x10^{-3}
Gold (79)	Au-196	S	4x10^{-8}	2x10^{-4}
		I	2x10^{-8}	1x10^{-4}
	Au-198	S	1x10^{-8}	5x10^{-5}
		I	8x10^{-9}	5x10^{-5}
	Au-199	S	4x10^{-8}	2x10^{-4}
		I	3x10^{-8}	2x10^{-4}
Hafnium (72)	Hf-181	S	1x10^{-9}	7x10^{-5}
		I	3x10^{-9}	7x10^{-5}
Holmium (67)	Ho-166	S	7x10^{-9}	3x10^{-5}
		I	6x10^{-9}	3x10^{-5}
Hydrogen (1)	H-3	S	2x10^{-7}	3x10^{-3}
		I	2x10^{-7}	3x10^{-3}
		Sub	4x10^{-5}	—
Indium (49)	In-113m	S	3x10^{-7}	1x10^{-3}
		I	2x10^{-7}	1x10^{-3}
	In-114m	S	4x10^{-9}	2x10^{-5}
		I	7x10^{-10}	2x10^{-5}
	In-115m	S	8x10^{-8}	4x10^{-4}

Element (Atomic Number)	Isotope†		Column 1: Air (μCi/ml)	Column 2: Water (μCi/ml)
		I	$6x10^{-8}$	$4x10^{-4}$
	In-115	S	$9x10^{-9}$	$9x10^{-5}$
		I	$1x10^{-9}$	$9x10^{-5}$
Iodine (53)	I-125	S	$8x10^{-11}$	$2x10^{-7}$
		I	$6x10^{-9}$	$2x10^{-4}$
	I-126	S	$9x10^{-11}$	$3x10^{-7}$
		I	$1x10^{-8}$	$9x10^{-5}$
	I-129	S	$2x10^{-11}$	$6x10^{-8}$
		I	$2x10^{-9}$	$2x10^{-4}$
	I-131	S	$1x10^{-10}$	$3x10^{-7}$
		I	$1x10^{-8}$	$6x10^{-5}$
	I-132	S	$3x10^{-9}$	$8x10^{-6}$
		I	$3x10^{-8}$	$2x10^{-4}$
	I-133	S	$4x10^{-10}$	$1x10^{-6}$
		I	$7x10^{-9}$	$4x10^{-5}$
	I-134	S	$6x10^{-9}$	$2x10^{-5}$
		I	$1x10^{-7}$	$6x10^{-4}$
	I-135	S	$1x10^{-9}$	$4x10^{-6}$
		I	$1x10^{-8}$	$7x10^{-5}$
Iridium (77)	Ir-190	S	$4x10^{-8}$	$2x10^{-4}$
		I	$1x10^{-8}$	$2x10^{-4}$
	Ir-192	S	$4x10^{-9}$	$4x10^{-5}$
		I	$9x10^{-10}$	$4x10^{-5}$
	Ir-194	S	$8x10^{-9}$	$3x10^{-5}$
		I	$5x10^{-9}$	$3x10^{-5}$
Iron (26)	Fe-55	S	$3x10^{-8}$	$8x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-3}$
	Fe-59	S	$5x10^{-9}$	$6x10^{-5}$
		I	$2x10^{-9}$	$5x10^{-5}$
Krypton (36)	Kr-85m	Sub	$1x10^{-7}$	—
	Kr-85	Sub	$3x10^{-7}$	—
	Kr-87	Sub	$2x10^{-8}$	—
	Kr-88	Sub	$2x10^{-8}$	—
Lanthanum (57)	La-140	S	$5x10^{-9}$	$2x10^{-5}$
		I	$4x10^{-9}$	$2x10^{-5}$
Lead (82)	Pb-203	S	$9x10^{-8}$	$4x10^{-4}$
		I	$6x10^{-8}$	$4x10^{-4}$
	Pb-210	S	$4x10^{-12}$	$1x10^{-7}$
		I	$8x10^{-12}$	$2x10^{-4}$
	Pb-212	S	$6x10^{-10}$	$2x10^{-5}$
		I	$7x10^{-10}$	$2x10^{-5}$
Lutetium (71)	Lu-177	S	$2x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Manganese (25)	Mn-52	S	$7x10^{-9}$	$3x10^{-5}$
		I	$5x10^{-9}$	$3x10^{-5}$
	Mn-54	S	$1x10^{-8}$	$1x10^{-4}$
		I	$1x10^{-9}$	$1x10^{-4}$
	Mn-56	S	$3x10^{-8}$	$1x10^{-4}$

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
		I	$2x10^{-8}$	$1x10^{-4}$
Mercury (80)	Hg-197m	S	$3x10^{-8}$	$2x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-4}$
	Hg-197	S	$4x10^{-8}$	$3x10^{-4}$
		I	$9x10^{-8}$	$5x10^{-4}$
	Hg-203	S	$2x10^{-9}$	$2x10^{-5}$
		I	$4x10^{-9}$	$1x10^{-4}$
Molybdenum (42)	Mo-99	S	$3x10^{-8}$	$2x10^{-4}$
		I	$7x10^{-9}$	$4x10^{-5}$
Neodymium (60)	Nd-144	S	$3x10^{-12}$	$7x10^{-5}$
		I	$1x10^{-11}$	$8x10^{-5}$
	Nd-147	S	$1x10^{-8}$	$6x10^{-5}$
		I	$8x10^{-9}$	$6x10^{-5}$
	Nd-149	S	$6x10^{-8}$	$3x10^{-4}$
		I	$5x10^{-8}$	$3x10^{-4}$
Neptunium (93)	Np-237	S	$1x10^{-13}$	$3x10^{-6}$
		I	$4x10^{-12}$	$3x10^{-5}$
	Np-239	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Nickel (28)	Ni-59	S	$2x10^{-8}$	$2x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-3}$
	Ni-63	S	$2x10^{-9}$	$3x10^{-5}$
		I	$1x10^{-8}$	$7x10^{-4}$
	Ni-65	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Niobium (41)	Nb-93m	S	$4x10^{-9}$	$4x10^{-4}$
		I	$5x10^{-9}$	$4x10^{-4}$
	Nb-95	S	$2x10^{-8}$	$1x10^{-4}$
		I	$3x10^{-9}$	$1x10^{-4}$
	Nb-97	S	$2x10^{-7}$	$9x10^{-4}$
		I	$2x10^{-7}$	$9x10^{-4}$
Osmium (76)	Os-185	S	$2x10^{-8}$	$7x10^{-5}$
		I	$2x10^{-9}$	$7x10^{-5}$
	Os-191m	S	$6x10^{-7}$	$3x10^{-3}$
		I	$3x10^{-7}$	$2x10^{-3}$
	Os-191	S	$4x10^{-8}$	$2x10^{-4}$
		I	$1x10^{-8}$	$2x10^{-4}$
	Os-193	S	$1x10^{-8}$	$6x10^{-5}$
		I	$9x10^{-9}$	$5x10^{-5}$
Palladium (46)	Pd-103	S	$5x10^{-8}$	$3x10^{-4}$
		I	$3x10^{-8}$	$3x10^{-4}$
	Pd-109	S	$2x10^{-8}$	$9x10^{-5}$
		I	$1x10^{-8}$	$7x10^{-5}$
Phosphorus (15)	P-32	S	$2x10^{-9}$	$2x10^{-5}$
		I	$3x10^{-9}$	$2x10^{-5}$
Platinum (78)	Pt-191	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
	Pt-193m	S	$2x10^{-7}$	$1x10^{-3}$

Element (Atomic Number)	Isotope†		Column 1: Air (μCi/ml)	Column 2: Water (μCi/ml)
		I	$2x10^{-7}$	$1x10^{-3}$
	Pt-193	S	$4x10^{-8}$	$9x10^{-4}$
		I	$1x10^{-8}$	$2x10^{-3}$
	Pt-197m	S	$2x10^{-7}$	$1x10^{-3}$
		I	$2x10^{-7}$	$9x10^{-4}$
	Pt-197	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Plutonium (94)	Pu-238	S	$7x10^{-14}$	$5x10^{-6}$
		I	$1x10^{-12}$	$3x10^{-5}$
	Pu-239	S	$6x10^{-14}$	$5x10^{-6}$
		I	$1x10^{-12}$	$3x10^{-5}$
	Pu-240	S	$6x10^{-14}$	$5x10^{-6}$
		I	$1x10^{-12}$	$3x10^{-5}$
	Pu-241	S	$3x10^{-12}$	$2x10^{-4}$
		I	$1x10^{-9}$	$1x10^{-3}$
	Pu-242	S	$6x10^{-14}$	$5x10^{-6}$
		I	$1x10^{-12}$	$3x10^{-5}$
	Pu-243	S	$6x10^{-8}$	$3x10^{-4}$
		I	$8x10^{-8}$	$3x10^{-4}$
	Pu-244	S	$6x10^{-14}$	$4x10^{-6}$
		I	$1x10^{-12}$	$1x10^{-5}$
Polonium (84)	Po-210	S	$2x10^{-11}$	$7x10^{-7}$
		I	$7x10^{-12}$	$3x10^{-5}$
Potassium (19)	K-42	S	$7x10^{-8}$	$3x10^{-4}$
		I	$4x10^{-9}$	$2x10^{-5}$
Praseodymium (59)	Pr-142	S	$7x10^{-9}$	$3x10^{-5}$
		I	$5x10^{-9}$	$3x10^{-5}$
	Pr-143	S	$1x10^{-8}$	$5x10^{-5}$
		I	$6x10^{-9}$	$5x10^{-5}$
Promethium (61)	Pm-147	S	$2x10^{-9}$	$2x10^{-4}$
		I	$3x10^{-9}$	$2x10^{-4}$
	Pm-149	S	$1x10^{-8}$	$4x10^{-5}$
		I	$8x10^{-9}$	$4x10^{-5}$
Protactinium (91)	Pa-230	S	$6x10^{-11}$	$2x10^{-4}$
		I	$3x10^{-11}$	$2x10^{-4}$
	Pa-231	S	$4x10^{-14}$	$9x10^{-7}$
		I	$4x10^{-12}$	$2x10^{-5}$
	Pa-233	S	$2x10^{-8}$	$1x10^{-4}$
		I	$6x10^{-9}$	$1x10^{-4}$
Radium (88)	Ra-223	S	$6x10^{-11}$	$7x10^{-7}$
		I	$8x10^{-12}$	$4x10^{-6}$
	Ra-224	S	$2x10^{-10}$	$2x10^{-6}$
		I	$2x10^{-11}$	$5x10^{-6}$
	Ra-226	S	$3x10^{-12}$	$3x10^{-8}$
		I	$2x10^{-12}$	$3x10^{-5}$
	Ra-228	S	$2x10^{-12}$	$3x10^{-8}$
		I	$1x10^{-12}$	$3x10^{-5}$

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
Radon (86)	Rn-220	S	$1x10^{-8}$	—
	Rn-222††	S	$3x10^{-9}$	—
Rhenium (75)	Re-183	S	$9x10^{-8}$	$6x10^{-4}$
		I	$5x10^{-9}$	$3x10^{-4}$
	Re-186	S	$2x10^{-8}$	$9x10^{-5}$
		I	$8x10^{-9}$	$5x10^{-5}$
	Re-187	S	$3x10^{-7}$	$3x10^{-3}$
		I	$2x10^{-8}$	$2x10^{-3}$
	Re-188	S	$1x10^{-8}$	$6x10^{-5}$
		I	$6x10^{-9}$	$3x10^{-5}$
Rhodium (45)	Rh-103m	S	$3x10^{-6}$	$1x10^{-2}$
		I	$2x10^{-6}$	$1x10^{-2}$
	Rh-105	S	$3x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Rubidium (37)	Rb-86	S	$1x10^{-8}$	$7x10^{-5}$
		I	$2x10^{-9}$	$2x10^{-5}$
	Rb-87	S	$2x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-9}$	$2x10^{-4}$
Ruthenium (44)	Ru-97	S	$8x10^{-8}$	$4x10^{-4}$
		I	$6x10^{-8}$	$3x10^{-4}$
	Ru-103	S	$2x10^{-8}$	$8x10^{-5}$
		I	$3x10^{-9}$	$8x10^{-5}$
	Ru-105	S	$2x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
	Ru-106	S	$3x10^{-9}$	$1x10^{-5}$
		I	$2x10^{-10}$	$1x10^{-5}$
Samarium (62)	Sm-147	S	$2x10^{-12}$	$6x10^{-5}$
		I	$9x10^{-12}$	$7x10^{-5}$
	Sm-151	S	$2x10^{-9}$	$4x10^{-4}$
		I	$5x10^{-9}$	$4x10^{-4}$
	Sm-153	S	$2x10^{-8}$	$8x10^{-5}$
		I	$1x10^{-8}$	$8x10^{-5}$
Scandium (21)	Sc-46	S	$8x10^{-9}$	$4x10^{-5}$
		I	$8x10^{-10}$	$4x10^{-5}$
	Sc-47	S	$2x10^{-8}$	$9x10^{-5}$
		I	$2x10^{-8}$	$9x10^{-5}$
	Sc-48	S	$6x10^{-9}$	$3x10^{-5}$
		I	$5x10^{-9}$	$3x10^{-5}$
Selenium (34)	Se-75	S	$4x10^{-8}$	$3x10^{-4}$
		I	$4x10^{-9}$	$3x10^{-4}$
Silicon (14)	Si-31	S	$2x10^{-7}$	$9x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-4}$
Silver (47)	Ag-105	S	$2x10^{-8}$	$1x10^{-4}$
		I	$3x10^{-9}$	$1x10^{-4}$
	Ag-110m	S	$7x10^{-9}$	$3x10^{-5}$
		I	$3x10^{-10}$	$3x10^{-5}$
	Ag-111	S	$1x10^{-8}$	$4x10^{-5}$
		I	$8x10^{-9}$	$4x10^{-5}$

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
Sodium (11)	Na-22	S	$6x10^{-9}$	$4x10^{-5}$
		I	$3x10^{-10}$	$3x10^{-5}$
	Na-24	S	$4x10^{-8}$	$2x10^{-4}$
		I	$5x10^{-9}$	$3x10^{-5}$
Strontium (38)	Sr-85m	S	$1x10^{-6}$	$7x10^{-3}$
		I	$1x10^{-6}$	$7x10^{-3}$
	Sr-85	S	$8x10^{-9}$	$1x10^{-4}$
		I	$4x10^{-9}$	$2x10^{-4}$
	Sr-89	S	$3x10^{-10}$	$3x10^{-6}$
		I	$1x10^{-9}$	$3x10^{-5}$
	Sr-90	S	$3x10^{-11}$	$3x10^{-7}$
		I	$2x10^{-10}$	$4x10^{-5}$
	Sr-91	S	$2x10^{-8}$	$7x10^{-5}$
		I	$9x10^{-9}$	$5x10^{-5}$
	Sr-92	S	$2x10^{-8}$	$7x10^{-5}$
		I	$1x10^{-8}$	$6x10^{-5}$
Sulfur (16)	S-35	S	$9x10^{-9}$	$6x10^{-5}$
		I	$9x10^{-9}$	$3x10^{-4}$
Tantalum (73)	Ta-182	S	$1x10^{-9}$	$4x10^{-5}$
		I	$7x10^{-10}$	$4x10^{-5}$
Technetium (43)	Tc-96m	S	$3x10^{-6}$	$1x10^{-2}$
		I	$1x10^{-6}$	$1x10^{-2}$
	Tc-96	S	$2x10^{-8}$	$1x10^{-4}$
		I	$8x10^{-9}$	$5x10^{-5}$
	Tc-97m	S	$8x10^{-8}$	$4x10^{-4}$
		I	$5x10^{-9}$	$2x10^{-4}$
	Tc-97	S	$4x10^{-7}$	$2x10^{-3}$
		I	$1x10^{-8}$	$8x10^{-4}$
	Tc-99m	S	$1x10^{-6}$	$6x10^{-3}$
		I	$5x10^{-7}$	$3x10^{-3}$
	Tc-99	S	$7x10^{-8}$	$3x10^{-4}$
		I	$2x10^{-9}$	$2x10^{-4}$
Tellurium (52)	Te-125m	S	$1x10^{-8}$	$2x10^{-4}$
		I	$4x10^{-9}$	$1x10^{-4}$
	Te-127m	S	$5x10^{-9}$	$6x10^{-5}$
		I	$1x10^{-9}$	$5x10^{-5}$
	Te-127	S	$6x10^{-8}$	$3x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-4}$
	Te-129m	S	$3x10^{-9}$	$3x10^{-5}$
		I	$1x10^{-9}$	$2x10^{-5}$
	Te-129	S	$2x10^{-7}$	$8x10^{-4}$
		I	$1x10^{-7}$	$8x10^{-4}$
	Te-131m	S	$1x10^{-8}$	$6x10^{-5}$
		I	$6x10^{-9}$	$4x10^{-5}$
	Te-132	S	$7x10^{-9}$	$3x10^{-5}$
		I	$4x10^{-9}$	$2x10^{-5}$
Terbium (65)	Tb-160	S	$3x10^{-9}$	$4x10^{-5}$
		I	$1x10^{-9}$	$4x10^{-5}$

Element (Atomic Number)	Isotope†		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
Thallium (81)	Tl-200	S	$9x10^{-8}$	$4x10^{-4}$
		I	$4x10^{-8}$	$2x10^{-4}$
	Tl-201	S	$7x10^{-8}$	$3x10^{-4}$
		I	$3x10^{-8}$	$2x10^{-4}$
	Tl-202	S	$3x10^{-8}$	$1x10^{-4}$
		I	$8x10^{-9}$	$7x10^{-5}$
	Tl-204	S	$2x10^{-8}$	$1x10^{-4}$
		I	$9x10^{-10}$	$6x10^{-5}$
Thorium (90)	Th-227	S	$1x10^{-11}$	$2x10^{-5}$
		I	$6x10^{-12}$	$2x10^{-5}$
	Th-228	S	$3x10^{-13}$	$7x10^{-6}$
		I	$2x10^{-13}$	$1x10^{-5}$
	Th-230	S	$8x10^{-14}$	$2x10^{-6}$
		I	$3x10^{-13}$	$3x10^{-5}$
	Th-231	S	$5x10^{-8}$	$2x10^{-4}$
		I	$4x10^{-8}$	$2x10^{-4}$
	Th-232	S	$1x10^{-12}$	$2x10^{-6}$
		I	$1x10^{-12}$	$4x10^{-5}$
	Th-natural	S	$2x10^{-12}$	$2x10^{-6}$
		I	$2x10^{-12}$	$2x10^{-5}$
	Th-234	S	$2x10^{-9}$	$2x10^{-5}$
		I	$1x10^{-9}$	$2x10^{-5}$
Thulium (69)	Tm-170	S	$1x10^{-9}$	$5x10^{-5}$
		I	$1x10^{-9}$	$5x10^{-5}$
	Tm-171	S	$4x10^{-9}$	$5x10^{-4}$
		I	$8x10^{-9}$	$5x10^{-4}$
Tin (50)	Sn-113	S	$1x10^{-8}$	$9x10^{-5}$
		I	$2x10^{-9}$	$8x10^{-5}$
	Sn-125	S	$4x10^{-9}$	$2x10^{-5}$
		I	$3x10^{-9}$	$2x10^{-5}$
Tungsten (74)	W-181	S	$8x10^{-8}$	$4x10^{-4}$
		I	$4x10^{-9}$	$3x10^{-4}$
	W-185	S	$3x10^{-8}$	$1x10^{-4}$
		I	$4x10^{-9}$	$1x10^{-4}$
	W-187	S	$2x10^{-8}$	$7x10^{-5}$
		I	$1x10^{-8}$	$6x10^{-5}$
Uranium (92)	U-230	S	$1x10^{-11}$	$5x10^{-6}$
		I	$4x10^{-12}$	$5x10^{-6}$
	U-232	S	$3x10^{-12}$	$3x10^{-5}$
		I	$9x10^{-13}$	$3x10^{-5}$
	U-233	S	$2x10^{-11}$	$3x10^{-5}$
		I	$4x10^{-12}$	$3x10^{-5}$
	U-234	S‡	$2x10^{-11}$	$3x10^{-5}$
		I	$4x10^{-12}$	$3x10^{-5}$
	U-235	S‡	$2x10^{-11}$	$3x10^{-5}$
		I	$4x10^{-12}$	$3x10^{-5}$
	U-236	S	$2x10^{-11}$	$3x10^{-5}$
		I	$4x10^{-12}$	$3x10^{-5}$

Element (Atomic Number)	Isotope[†]		Column 1: Air (µCi/ml)	Column 2: Water (µCi/ml)
	U-238	S[‡]	$3x10^{-12}$	$4x10^{-5}$
		I	$5x10^{-12}$	$4x10^{-5}$
	U-240	S	$8x10^{-9}$	$3x10^{-5}$
		I	$6x10^{-9}$	$3x10^{-5}$
	U-natural	S[‡]	$5x10^{-12}$	$3x10^{-5}$
		I	$5x10^{-12}$	$3x10^{-5}$
Vanadium (23)	V-48	S	$6x10^{-9}$	$3x10^{-5}$
		I	$2x10^{-9}$	$3x10^{-5}$
Xenon (54)	Xe-131m	Sub	$4x10^{-7}$	—
	Xe-133m	Sub	$3x10^{-7}$	—
	Xe-133	Sub	$3x10^{-7}$	—
	Xe-135	Sub	$1x10^{-7}$	—
Ytterbium (70)	Yb-175	S	$2x10^{-8}$	$1x10^{-4}$
		I	$2x10^{-8}$	$1x10^{-4}$
Yttrium (39)	Y-90	S	$4x10^{-9}$	$2x10^{-5}$
		I	$3x10^{-9}$	$2x10^{-5}$
	Y-91m	S	$8x10^{-7}$	$3x10^{-3}$
		I	$6x10^{-7}$	$3x10^{-3}$
	Y-91	S	$1x10^{-9}$	$3x10^{-5}$
		I	$1x10^{-9}$	$3x10^{-5}$
	Y-92	S	$1x10^{-8}$	$6x10^{-5}$
		I	$1x10^{-8}$	$6x10^{-5}$
	Y-93	S	$6x10^{-9}$	$3x10^{-5}$
		I	$5x10^{-9}$	$3x10^{-5}$
Zinc (30)	Zn-65	S	$4x10^{-9}$	$1x10^{-4}$
		I	$2x10^{-9}$	$2x10^{-4}$
	Zn-69m	S	$1x10^{-8}$	$7x10^{-5}$
		I	$1x10^{-8}$	$6x10^{-5}$
	Zn-69	S	$2x10^{-7}$	$2x10^{-3}$
		I	$3x10^{-7}$	$2x10^{-3}$
Zirconium (40)	Zr-93	S	$4x10^{-9}$	$8x10^{-4}$
		I	$1x10^{-8}$	$8x10^{-4}$
	Zr-95	S	$4x10^{-9}$	$6x10^{-5}$
		I	$1x10^{-9}$	$6x10^{-5}$
	Zr-97	S	$4x10^{-9}$	$2x10^{-5}$
		I	$3x10^{-9}$	$2x10^{-5}$
Any single radio-nuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio-active half-life less than two hours.		Sub	$3x10^{-8}$	—
Any single radio-nuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than two hours.			$1x10^{-10}$	$3x10^{-6}$

Element (Atomic Number)	Isotope†	Column 1: Air (μCi/ml)	Column 2: Water (μCi/ml)
Any single radio-nuclide not listed above, which decays by alpha emission or spontaneous fission.		2×10^{-14}	3×10^{-8}

† S: Soluble
I: Insoluble
Sub: values given are for submersion in a semispherical infinite cloud of airborne material.

†† These radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. Alternatively, this value may be replaced by one-thirtieth (1/30) of a working level. (A "working level" is defined as any combination of short-lived radon-222 daughters, polonium-218, lead-214, bismuth-214 and polonium-214, in one liter of air, without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3×10^5 MeV of alpha particle energy.)

‡ For soluble mixtures of U-238, U-234 and U-235 in air, chemical toxicity may be the limiting factor. If the percent by weight (enrichment) of U-235 is less than 5, the concentration value is 0.007 milligrams uranium per cubic meter of air. The specific activity for natural uranium is 6.77×10^{-7} curies per gram uranium. The specific activity for other mixtures of U-238, U-235 and U-234, if not known, shall be:

SA = 3.6×10^{-7} curies/gram U U-depleted
SA = $(0.4 + 0.38\,E + 0.0034\,E^2)\,10^{-6}$ $E \geq 0.72$

where E is the percentage by weight of U-235, expressed as percent.

Note: In any case where there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of Table 3 should be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting values should be derived as follows:

Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in Table 3 for the specific radionuclide when not in a mixture. The sum of such ratios for all the radio-nuclides in the mixture may not exceed "1" (i.e., "unity").

Example: If radionuclides a, b and c are present in concentrations Ca, Cb and Cc and if the applicable maximum permissible concentrations (MPCs) are MPC_a, MPC_b and MPC_c respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_a}{MPC_a} + \frac{C_b}{MPC_b} + \frac{C_c}{MPC_c} \leq 1$$

2. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of Table 3 shall be:

a. For purposes of Table 3, Column 1 .... 2×10^{-14}
b. For purposes of Table 3, Column 2...................... 3×10^{-8}

3. If any of the conditions specified below are met, the corresponding values specified below may be used in lieu of those specified in paragraph 2 above.

a. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in Table 3 for the radionuclide in the mixture having the lowest concentration limit; or

b. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in Table 3 are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in Table 3 for any radionuclide which is not known to be absent from the mixture; or

c.

Radionuclide	**Column 1: Air (µCi/ml)**	**Column 2: Water (µCi/ml)**
If it is known that Sr-90, I-125, I-126, I-129, I-131, I-133, Pb-210, Po-210, At-211, Ra-223, Ra-224, Ra-226, Ac-227, Ra-228, Th-230, Pa-231, Th-232, Th-nat, Cm-248, Cf-254, and Fm-256 are not present	—	$3x10^{-6}$
If it is known that Sr-90, I-125, I-126, I-129, I-131, I-133, Pb-210, Po-210, Ra-223, Ra-226, Ra-228, Pa-231, Th-nat, Cm-248, CF-254 and Fm-256 are not present	—	$2x10^{-6}$
If it is known that Sr-90, I-129 I-125, I-126, I-131, Pb-210, Ra-226, Ra-228, Cm-248 and Cf-254 are not present	—	$6x10^{-7}$
If it is known that I-129, Ra-226, and Ra-228 are not present-	—	$1x10^{-7}$
If it is known that alpha-emitters and Sr-90, I-129, Pb-210, Ac-227, Ra-228, Pa-230, Pu-241 and Bk-249 are not present	$1x10^{-10}$	—
If it is known that alpha-emitters and Pb-210, Ac-227, Ra-228 and Pu-241 are not present	$1x10^{-11}$	—
If it known that alpha-emitters and Ac-227 are not present	$1x10^{-12}$	—
If it is known that Ac-227, Th-230, Pa-231, Pu-238, Pu-239, Pu-240, Pu-242, Pu-244, Cm-248, Cf-249 and Cf-251 are not present	$1x10^{-13}$	—

4. If a mixture of radionuclides consists of uranium and its daughters in ore dust prior to chemical separation of the uranium from the ore, the values specified below may be used for uranium and its daughters through radium-226, instead of those from paragraph 1, 2 or 3 above.

For purposes of Table 3, Column 1, 3 x 10^{-12} µCi/ml gross alpha activity; 2 x 10^{-12} µCi/ml natural uranium; or 3 micrograms per cubic meter of air natural uranium.

5. For purposes of this note, a radionuclide may be considered as not present in a mixture if (a) the ratio of the concentration of that radionuclide in the mixture (C_a) to the concentration

limit for that radionuclide specified in Table 3 (MPC_a) does not exceed 1/10, (i.e., $C_a/MPC_a \leq 1/10$) and (b) the sum of such ratios for all radionuclides considered as not present in the mixture does not exceed 1/4, (i.e., $C_a/MPC_a + C_b/MPC_b + \ldots \leq 1/4$).

Note: To convert µCi/ml to SI units of megabecquerels per liter multiply the above values by 37.