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ATOMIC ENERGY COMMISSION

10 CFR PART 20

STANDARDS FOR PROTECTION AGAINST RADIATION

Radioactivity Concentrations in Air and Water

On August 10, 1965, the Commission published in the FEDERAL REGISTER (30 F. R. 9953), a proposed amendment of its regulation, "Standards for Protection Against Radiation", 10 CFR Part 20, which would (1) provide values for certain individual radionuclides not presently listed in Appendix B, (2) provide values generally applicable to radionuclides not individually listed, (3) revise existing values for occupational exposure to soluble strontium-90, and (4) modify the footnotes and the Note following Appendix B to make them consistent with other changes in the Appendix.

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendment within sixty days after publication of the notice in the FEDERAL REGISTER.

Upon consideration of the comment received, and other factors involved, the Commission has concluded that the proposed amendment, with two minor changes, should be published as an effective rule. Except for these changes, namely the addition of concentration values for xenon-133m, and the deletion of the last line of Note 3.c., the text of the amendment set out below is identical with the text of the proposed amendment published August 10, 1965.

Pursuant to the Atomic Energy Act of 1954, as amended, and the Administrative Procedure Act of 1946, the following amendment of Title 10, Chapter I, Part 20, Code of Federal Regulations, is published as a document subject to codification, to be effective thirty (30) days after publication in the FEDERAL REGISTER.

1. 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", is amended to include the following radionuclides:

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

Element (atomic number)	Isotope		Table I		Table II	
			Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
Hydrogen (1)	H 3	I	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
Iodine (53)	I 125	S	5×10^{-9}	4×10^{-5}	8×10^{-11}	2×10^{-7}
		I	2×10^{-7}	6×10^{-3}	6×10^{-9}	2×10^{-4}
Krypton (36)	Kr 88	Sub	1×10^{-6}	--	2×10^{-8}	--
Xenon (54)	Xe 133m	Sub	1×10^{-5}	--	3×10^{-7}	--
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.		Sub	1×10^{-6}	--	3×10^{-8}	--

Element (atomic number)	Isotope		Table I Column 1 Air (uc/ml)	Table I Column 2 Water (uc/ml)	Table II Column 1 Air (uc/ml)	Table II Column 2 Water (uc/ml)
			* * *			
Americium (95)	Am 242 m	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	3×10^{-10}	3×10^{-3}	9×10^{-12}	9×10^{-5}
	Am 242	S	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
		I	5×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Am 244	S	4×10^{-6}	1×10^{-1}	1×10^{-7}	5×10^{-3}
		I	2×10^{-5}	1×10^{-1}	8×10^{-7}	5×10^{-3}
Berkelium (97)	Bk 250	S	1×10^{-7}	6×10^{-3}	5×10^{-9}	2×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Californium (98)	Cf 251	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
	Cf 253	S	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
		I	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
	Cf 254	S	5×10^{-12}	4×10^{-6}	2×10^{-13}	1×10^{-7}
		I	5×10^{-12}	4×10^{-6}	2×10^{-13}	1×10^{-7}
Curium (96)	Cm 247	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	6×10^{-4}	4×10^{-12}	2×10^{-5}
	Cm 248	S	6×10^{-13}	1×10^{-5}	2×10^{-14}	4×10^{-7}
		I	1×10^{-11}	4×10^{-5}	4×10^{-13}	1×10^{-6}
	Cm 249	S	1×10^{-5}	6×10^{-2}	4×10^{-7}	2×10^{-3}
		I	1×10^{-5}	6×10^{-2}	4×10^{-7}	2×10^{-3}

Element (atomic number)	Isotope		Table I		Table II	
			Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
Einsteinium (99)	Es 253	S	8×10^{-10}	7×10^{-4}	3×10^{-11}	2×10^{-5}
		I	6×10^{-10}	7×10^{-4}	2×10^{-11}	2×10^{-5}
	Es 254m	S	5×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
		I	6×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
	Es 254	S	2×10^{-11}	4×10^{-4}	6×10^{-13}	1×10^{-5}
		I	1×10^{-10}	4×10^{-4}	4×10^{-12}	1×10^{-5}
	Es 255	S	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-5}
		I	4×10^{-10}	8×10^{-4}	1×10^{-11}	3×10^{-5}
Fermium (100)	Fm 254	S	6×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
		I	7×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Fm 255	S	2×10^{-8}	1×10^{-3}	6×10^{-10}	3×10^{-5}
		I	1×10^{-8}	1×10^{-3}	4×10^{-10}	3×10^{-5}
	Fm 256	S	3×10^{-9}	3×10^{-5}	1×10^{-10}	9×10^{-7}
		I	2×10^{-9}	3×10^{-5}	6×10^{-11}	9×10^{-7}
Plutonium (94)	Pu 243	S	2×10^{-6}	1×10^{-2}	6×10^{-8}	3×10^{-4}
		I	2×10^{-6}	1×10^{-2}	8×10^{-8}	3×10^{-4}
	Pu 244	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	3×10^{-11}	3×10^{-4}	1×10^{-12}	1×10^{-5}
Uranium (92)	U 240	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}

Element (atomic number)	Isotope	Table I		Table II	
		Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.		3×10^{-9}	9×10^{-5}	1×10^{-10}	3×10^{-6}
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.		6×10^{-13}	4×10^{-7}	2×10^{-14}	3×10^{-8}

* * *

2. 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", is amended by deleting the existing concentration values, and substituting therefor the indicated values for the following nuclide :

APPENDIX B

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

Element (atomic number)	Isotope	Table I		Table II	
		Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
		* * *			
Strontium (38)	Sr 90 S	1×10^{-9}	1×10^{-5}	No change	No change

3. The footnotes and the Note following 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", are amended to read as follows:

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1 Soluble (S); Insoluble (I).

2 "Sub" means that values given are for submersion in a semi-spherical infinite cloud of airborne material.

NOTE: * * *

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

a. For purposes of Table I, Col. 1 --- 6×10^{-13}

b. For purposes of Table I, Col. 2 --- 4×10^{-7}

c. For purposes of Table II, Col. 1 --- 2×10^{-14}

d. For purposes of Table II, Col. 2 --- 3×10^{-8}

3. * * *

c. Element (atomic number) and isotope	TABLE I		TABLE II	
	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
If it is known that Sr 90, I 125, I 126, I 129, I 131, (I 133, Table II only), 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	-------	9×10^{-5}	---------	3×10^{-6}
If it is known that Sr 90, I 125, I 126, I 129, (I 131, I 133, Table II only), Pb 210, Po 210, Ra 223, Ra 226, Ra 228, Pa 231, Th-nat, Cm 248, Cf 254, and Fm 256 are not present	-------	6×10^{-5}	---------	2×10^{-6}
If it is known that Sr 90, I 129, (I 125, I 126, I 131, Table II only), Pb 210, Ra 226, Ra 228, Cm 248, and Cf 254 are not present	-------	2×10^{-5}	---------	6×10^{-7}
If it is known that (I 129, Table II only), Ra 226, and Ra 228 are not present	-------	3×10^{-6}	---------	1×10^{-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	3×10^{-9}	--------	1×10^{-10}	--------
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present	3×10^{-10}	--------	1×10^{-11}	--------
If it is known that alpha-emitters and Ac 227 are not present	3×10^{-11}	--------	1×10^{-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	3×10^{-12}	--------	1×10^{-13}	--------

AUTHORITY: (Sec. 161, 68 Stat. 948; 42 U. S. C. 2201)

Dated at Germantown, Maryland this 8th day of December, 1965.

FOR THE ATOMIC ENERGY COMMISSION

W. B. McCool
Secretary

ATOMIC ENERGY COMMISSION

/ 10 CFR PART 20 /

STANDARDS FOR PROTECTION AGAINST RADIATION

RADIOACTIVITY CONCENTRATIONS IN AIR AND WATER

On September 7, 1960, the Commission published in the FEDERAL REGISTER several amendments of 10 CFR Part 20, effective January 1, 1961. The amendments included a comprehensive revision of the values specified in 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background." The revised values were based upon recommendations of the National Committee on Radiation Protection and Measurements (NCRP), as published in National Bureau of Standards Handbook 69, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure." The recommendations of the International Commission on Radiological Protection (ICRP), as published in the "Report of Committee II on Permissible Dose for Internal Radiation", were essentially the same as those of the NCRP. The only subsequent change of these values was an amendment of 10 CFR Part 20, effective November 20, 1964, which revised the values in Appendix B for certain isotopes of iodine, radium and strontium, based on Federal Radiation Council (FRC) recommendations.

The amendment proposed herein modifies 10 CFR Part 20, Appendix B, in the following ways:

a) It would provide values for certain individual radionuclides not presently listed;

b) It would provide generally applicable values for any radionuclide not individually listed;

c) It would revise existing values for occupational exposure to soluble strontium-90; and

d) It would modify the footnotes and the Note following Appendix B to make them consistent with other changes to the Appendix.

In the course of the administration of the Commission's regulatory program, needs have arisen for concentration values for certain radionuclides, which are not presently listed in Appendix B, and which have not been specifically developed by any of the recommendatory bodies, namely the ICRP, the NCRP, and the FRC. The Commission has developed the needed values by methods consistent with those used by the ICRP and NCRP to develop recommended concentration values for the nuclides presently listed in Appendix B. In addition, concentration values are proposed for insoluble forms of tritium. The concentration values for these additional nuclides are listed in paragraph I.(a) of the proposed amendment. The considerations on which the values are based include the following:

a) For iodine-125, the values in Table II have been made consistent with the intake guides recommended by the FRC for iodine-131 by taking into account the effective half-life and absorbed radiation energy.

b) Presently, Appendix B does not contain concentration values for tritium in insoluble materials, such as luminous compounds, which are finding increasing use. Calculation according to ICRP-NCRP methodology would give air concentration values about a factor of 7 less, and water values about a factor of 2 less, than those for soluble forms. However, it is likely that much of the soft beta particle energy will not be absorbed in tissue, and on this basis higher concentration values would be appropriate. In view of these considerations and of the technical difficulties in distinguishing soluble and insoluble components, concentration values numerically equal to the existing values for soluble forms are proposed for inclusion in Appendix B for insoluble forms of tritium.

c) For relatively short-lived nuclides (half-lives less than 2 hours), not already specifically listed in Appendix B and decaying by modes other than alpha emission or spontaneous fission, it is unlikely that air concentration values will be less, and they cannot be greater (whether or not they are gases), than those based on submersion. To avoid the necessity to identify the individual nuclides which may be present, generally applicable values for such nuclides are proposed using a submersion calculation based on the assumption that the average energy per disintegration is not likely to be greater than about 2 Mev.

During 1964, the ICRP published the "Recommendations of the International Commission on Radiological Protection (As Amended 1959 and Revised 1962), ICRP Publication 6". In Table I of "Publication 6", ICRP has recommended

concentration values not previously developed for uranium-240 and nineteen transuranic nuclides. The proposed amendment includes, in paragraph 1.(b), values for these nuclides in Appendix B, based on the ICRP values. The ICRP has made revisions to previously recommended values for soluble forms of strontium-90*, which represent an increase over previous values of about a factor of three, based on evidence that the biological half-life is shorter than previously assumed. The proposed amendment includes, in paragraph 2., these revised values in Table I for soluble strontium-90; the values in Table II for soluble strontium-90 are not changed from the revised values made effective in November, 1964, which were based on FRC recommendations for the guidance of Federal agencies.

Although it is believed that, with the proposed amendment, Appendix B includes specific values for all nuclides currently of some radiological significance, other nuclides not specifically listed may become significant sources of exposure at some future time. Therefore, the proposed amendment also provides, in paragraph 1.(c), generally applicable values for any radionuclide not specifically listed, or covered by the short half-life category, based on the most restrictive values likely to be applied. The values proposed for any single unlisted nuclide that decays by alpha emission or spontaneous fission are those listed in paragraph 2. of the Note following Appendix B, as revised below; the values proposed for any other single, unlisted nuclide are the least restrictive of those appearing in paragraph 3.c. of the Note following Appendix B.

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* In "Publication 6", the ICRP also recommends certain changes applicable to soluble uranium. These recommendations are under study.

Finally, the proposed amendment, in paragraph 3., makes certain modifications to the footnotes and the Note following Appendix B, as follows:

a) In the second footnote, the word "gaseous" has been replaced with the word "airborne", since the submersion calculation has been extended to materials not necessarily in the gaseous form; in addition the word "semispherical" has been added to make clear the geometrical basis of the submersion calculation;

b) Paragraphs 2. and 3.c. of the Note following Appendix B are revised to make them consistent with the values contained in Appendix B as revised.

Pursuant to the Atomic Energy Act of 1954, as amended, and the Administrative Procedure Act of 1946, notice is hereby given that adoption of the following amendment of 10 CFR Part 20 is contemplated. All interested persons who desire to submit written comments or suggestions in connection with the proposed amendment should send them to the Secretary, United States Atomic Energy Commission, Washington, D. C., 20545, within 60 days after publication of this notice in the FEDERAL REGISTER. Comments received after that period will be considered if it is practicable to do so, but assurance of consideration cannot be given except as to comments filed within the period specified.

1. 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", is amended to include the following radionuclides:

APPENDIX B

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

	Element (atomic number)	Isotope		Table I		Table II	
				Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
(a)	Hydrogen (1)	H 3	I	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
	Iodine (53)	I 125	S	5×10^{-9}	4×10^{-5}	8×10^{-11}	2×10^{-7}
			I	2×10^{-7}	6×10^{-3}	6×10^{-9}	2×10^{-4}
	Krypton (36)	Kr 88	Sub	1×10^{-6}	--	2×10^{-8}	--
	Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.		Sub	1×10^{-6}	--	3×10^{-8}	--

Element (atomic number)	Isotope		Table I Column 1 Air (uc/ml)	Table I Column 2 Water (uc/ml)	Table II Column 1 Air (uc/ml)	Table II Column 2 Water (uc/ml)
			* * *			
(b) Americium (95)	Am 242 m	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	3×10^{-10}	3×10^{-3}	9×10^{-12}	9×10^{-5}
	Am 242	S	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
		I	5×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Am 244	S	4×10^{-6}	1×10^{-1}	1×10^{-7}	5×10^{-3}
		I	2×10^{-5}	1×10^{-1}	8×10^{-7}	5×10^{-3}
Berkelium (97)	Bk 250	S	1×10^{-7}	6×10^{-3}	5×10^{-9}	2×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Californium (98)	Cf 251	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
	Cf 253	S	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
		I	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
	Cf 254	S	5×10^{-12}	4×10^{-6}	2×10^{-13}	1×10^{-7}
		I	5×10^{-12}	4×10^{-6}	2×10^{-13}	1×10^{-7}
Curium (96)	Cm 247	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	6×10^{-4}	4×10^{-12}	2×10^{-5}
	Cm 248	S	6×10^{-13}	1×10^{-5}	2×10^{-14}	4×10^{-7}
		I	1×10^{-11}	4×10^{-5}	4×10^{-13}	1×10^{-6}
	Cm 249	S	1×10^{-5}	6×10^{-2}	4×10^{-7}	2×10^{-3}
		I	1×10^{-5}	6×10^{-2}	4×10^{-7}	2×10^{-3}

Element (atomic number)	Isotope		Table I		Table II	
			Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
Einsteinium (99)	Es 253	S	8×10^{-10}	7×10^{-4}	3×10^{-11}	2×10^{-5}
		I	6×10^{-10}	7×10^{-4}	2×10^{-11}	2×10^{-5}
	Es 254m	S	5×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
		I	6×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
	Es 254	S	2×10^{-11}	4×10^{-4}	6×10^{-13}	1×10^{-5}
		I	1×10^{-10}	4×10^{-4}	4×10^{-12}	1×10^{-5}
	Es 255	S	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-5}
		I	4×10^{-10}	8×10^{-4}	1×10^{-11}	3×10^{-5}
Fermium (100)	Fm 254	S	6×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
		I	7×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Fm 255	S	2×10^{-8}	1×10^{-3}	6×10^{-10}	3×10^{-5}
		I	1×10^{-8}	1×10^{-3}	4×10^{-10}	3×10^{-5}
	Fm 256	S	3×10^{-9}	3×10^{-5}	1×10^{-10}	9×10^{-7}
		I	2×10^{-9}	3×10^{-5}	6×10^{-11}	9×10^{-7}
Plutonium (94)	Pu 243	S	2×10^{-6}	1×10^{-2}	6×10^{-8}	3×10^{-4}
		I	2×10^{-6}	1×10^{-2}	8×10^{-8}	3×10^{-4}
	Pu 244	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	3×10^{-11}	3×10^{-4}	1×10^{-12}	1×10^{-5}
Uranium (92)	U 240	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}

Element (atomic number)	Isotope	Table I		Table II	
		Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
(c) Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.		3×10^{-9}	9×10^{-5}	1×10^{-10}	3×10^{-6}
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.		6×10^{-13}	4×10^{-7}	2×10^{-14}	3×10^{-8}

* * *

2. 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", is amended by deleting the existing concentration values, and substituting therefor the indicated values for the following nuclides:

APPENDIX B

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

Element (atomic number)	Isotope	Table I		Table II	
		Column 1 Air (uc/ml)	Column 2 Water (uc/ml)	Column 1 Air (uc/ml)	Column 2 Water (uc/ml)
		* * *			
Strontium (38)	Sr 90 S	1×10^{-9}	1×10^{-5}	No change	No change

3. The footnotes and the Note following 10 CFR Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", are amended to read as follows:

---

[1] Soluble (S); Insoluble (I).

[2] "Sub" means that values given are for submersion in a semi-spherical infinite cloud of airborne material.

NOTE: * * *

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

a. For purposes of Table I, Col. 1 --- 6×10^{-13}

b. For purposes of Table I, Col. 2 --- 4×10^{-7}

c. For purposes of Table II, Col. 1 --- 2×10^{-14}

d. For purposes of Table II, Col. 2 --- 3×10^{-8}

3. * * *

c. Element (atomic number) and isotope	TABLE I		TABLE II	
	Column 1 Air(uc/ml)	Column 2 Water(uc/ml)	Column 1 Air(uc/ml)	Column 2 Water(uc/ml)
If it is known that Sr 90, I 125, I 126, I 129, I 131, (I 133, Table II only), 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	-------	9×10^{-5}	---------	3×10^{-6}
If it is known that Sr 90, I 125, I 126, I 129, (I 131, I 133, Table II only), Pb 210, Po 210, Ra 223, Ra 226, Ra 228, Pa 231, Th-nat, Cm 248, Cf 254, and Fm 256 are not present	-------	6×10^{-5}	---------	2×10^{-6}
If it is known that Sr 90, I 129, (I 125, I 126, I 131, Table II only), Pb 210, Ra 226, Ra 228, Cm 248, and Cf 254 are not present	-------	2×10^{-5}	---------	6×10^{-7}
If it is known that (I 129, Table II only), Ra 226, and Ra 228 are not present	-------	3×10^{-6}	---------	1×10^{-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	3×10^{-9}	--------	1×10^{-10}	--------
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present	3×10^{-10}	--------	1×10^{-11}	--------
If it is known that alpha-emitters and Ac 227 are not present	3×10^{-11}	--------	1×10^{-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	3×10^{-12}	--------	1×10^{-13}	--------
If it is known that Pa 231, Pu 239, Pu 240, Pu 242, Pu 244, Cm 248, Cf 249 and Cf 251 are not present	2×10^{-12}	--------	7×10^{-14}	--------

(Sec. 161, 68 Stat. 948; 42 U.S.C. 2201)

Dated at Germantown, Maryland this 27th day of July , 1965.

FOR THE ATOMIC ENERGY COMMISSION

W. B. McCool
Secretary

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ATOMIC PRODUCTS DIVISION

ATOMIC POWER EQUIPMENT DEPARTMENT

October 13, 1965

Mr. W. B. McCool, Secretary
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: Proposed Amendment - 10CFR20 - Radioactivity Concentrations in Air and Water

Dear Mr. McCool:

The California components of General Electric's Atomic Products Division have reviewed the proposed amendments of 10CFR20 published in the Federal Register on August 10, 1965, and the following comments are offered for your consideration.

1. The proposed changes involving I-125, Kr-88, insoluble tritium, and the addition of the transuranium elements concentration limits, based on conventional technical considerations, are logical revisions and extensions of the tables.

2. The proposed limits for unlisted radioisotopes introduces a technical problem. In the case of a shorter than two hour half-life isotope, the proposed concentration limit for unrestricted water release would be set at 3×10^{-8} μc/cc. Since the permissible concentration basis is inversely proportioned to the effective energy per disintegration, this limit will be more or less conservative by the variation from 2 mev of the effective energy of any radioisotope under consideration. The magnitude of the problem is exemplified by results of noble gas calculations which indicate as much as 1×10^{-7} μc/cc, or three times the proposed concentration of Xe-135 and, as much as 2×10^{-6}, or 67 times the proposed concentration of Kr-83 m, could be safely released. On the other hand, similar calculations indicate the values for Cs-138 and Rb-88 compare nonconservatively with the proposed limit by about a factor of two.

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In view of these considerations, it is recommended that either of two alternative courses be pursued:

a) Extend the list to include values for a substantial number of currently unlisted radioisotopes using methods consistent with those used by the ICRP and NCRP, or

b) Provide, in conjunction with the currently proposed revision, a statement such that an applicant may propose limits different from those set for unlisted radioisotopes which will be approved if such limits are based on valid technological grounds.

If the Commission concludes it is desirable to further extend the list as suggested in item 2 above, General Electric would be pleased to work with the staff furnishing results of calculations which have been made in support of reactor licensing actions for a number of years.

Very truly yours,

B. D. Wilson
Administrator-Licensing

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27 August 1965

Mr. W. B. McCool, Secretary
U. S. Atomic Energy Commission
Washington, D. C.

Dear Mr. McCool:

In accordance with the notice in the Federal Register of Tuesday, August 10, 1965, the following comment concerning the proposed revisions to 10 CFR, Part 20, Appendix B - Concentrations in Air and Water Above Natural Background is submitted.

The permissible concentrations stated in Appendix B, Table I, Column 1 of 10 CFR, Part 20 are the same for Ac^{227}, Th^{230}, Pu^{238}, Pu^{239}, Pu^{240}, Pu^{242}, Pu^{244}, Cf^{249} and Cf^{251}; therefore, the last sentence, Item 3.C of the note following 10 CFR - Part 20, Appendix B which now reads:

	TABLE I		TABLE II	
	Col. 1 Air(μc/ml)	Col. 2 Water(μc/ml)	Col. 1 Air(μc/ml)	Col. 2 Water(μc/ml)
If it is known that Pa^{231}, Pu^{239}, Pu^{240}, Pu^{242}, Pu^{244}, Cm^{248}, Cf^{249}, and Cf^{251} are not present.....	2×10^{-12}	----	7×10^{-14}	----

should be changed to read:

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	TABLE I		TABLE II	
	Col. 1 Air (μc/ml)	Col. 2 Water (μc/ml)	Col. 1 Air (μc/ml)	Col. 2 Water (μc/ml)
If it is known that Pa^{231} and Cm^{248} are not present.....	2×10^{-12}	-----	----	----
If it is known that Pa^{231}, Pu^{239}, Pu^{240}, Pu^{242}, Pu^{244}, Cm^{248}, Cf^{249} and Cf^{251} are not present.....	----	----	7×10^{-14}	----

Very truly yours,

J W Brasher

J. W. Brasher
Chief Nuclear Scientist
Nuclear Power Division

JWB/yya