POLLUTION CONTROL BOARD

NOTICE OF PROPOSED AMENDMENTS

1) Heading of the Part: Radiation Hazards

2) Code Citation: 35 Ill. Adm. Code 1000

3)

Section Numbers:	Proposed Actions:
1000.101	Amendment
1000.102	Amendment
1000.103	Amendment
1000.201	Amendment
1000.202	New Section
1000.301	Amendment
1000.302	Amendment
1000.401	Amendment
1000.402	Amendment
1000.403	Amendment
1000.501	Amendment
1000.502	Amendment
1000.503	Amendment
1000.APPENDIX A	Amendment

4) Statutory Authority: Implementing and authorized by Sections 25(b) and 27 of the Environmental Protection Act [415 ILCS 5/25(b) and 27].

5) A Complete Description of the Subjects and Issues Involved: In 2016, the Board began reviewing its rules to identify obsolete, repetitive, confusing, or otherwise unnecessary language. On January 10, 2018, the Illinois Environmental Protection Agency (IEPA) filed a proposal to update provisions including Part 1000. IEPA's proposal arose from Executive Order 2016-13, which required agencies to identify outdated, repetitive, confusing, or unnecessary rules and then amend or repeal them. These proposed amendments to Part 1000 include those submitted by IEPA and those identified separately by the Board. Both IEPA and the Board intend the amendments to be non-substantive clarifications.

6) Published studies or reports, and sources of underlying data, used to compose this rulemaking: No

7) Will this proposed rulemaking replace an emergency rule currently in effect? No

8) Does this rulemaking contain an automatic repeal date? No

9) Does this proposed rulemaking contain incorporations by reference? Yes

POLLUTION CONTROL BOARD

NOTICE OF PROPOSED AMENDMENTS

10) Are there any proposed rulemakings to this Part pending? No

11) Statement of Statewide Policy Objectives: This proposed amendment does not create or enlarge a State mandate as defined in Section 3(b) of the State Mandates Act. [30 ILCS 805/3].

12) Time, Place, and Manner in which interested persons may comment on this proposed rulemaking: The Board will accept written public comments on this proposal for a period of at least 45 days after the date of publication in the Illinois Register. Public comments should refer to Docket R18-28 and be filed electronically through the Clerk's Office On-Line (COOL) on the Board's website at pcb.illinois.gov. Public comments may be addressed to:

Clerk's Office
Illinois Pollution Control Board
100 W. Randolph St., Suite 11-500
Chicago, IL 60601

Interested persons may download copies of the Board's opinions and orders in R18-28 from the Board's Web site at pcb.illinois.gov and may also request copies by calling the Clerk's office at 312-814-3620.

13) Initial Regulatory Flexibility Analysis:

A) Types of small businesses, small municipalities and not for profit corporations affected: None

B) Reporting, bookkeeping or other procedures required for compliance: None

C) Types of Professional skills necessary for compliance: None

14) Small Business Impact Analysis: The Board expects that this rulemaking will not have an adverse impact on small business.

15) Regulatory Agenda on which this rulemaking was summarized: January 2022

The full text of the Proposed Amendments begins on the next page:

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE I: ATOMIC RADIATION
CHAPTER I: POLLUTION CONTROL BOARD

PART 1000
RADIATION HAZARDS

SUBPART A: GENERAL PROVISIONS

Section
1000.101 Authority
1000.102 Purpose
1000.103 Scope

SUBPART B: DEFINITIONS

Section
1000.201 Definitions
1000.202 Incorporations by Reference

SUBPART C: STANDARDS AND LIMITATIONS

Section
1000.301 Permissible Levels of Radiation in Unrestricted Areas
1000.302 Radioactive Emissions to Unrestricted Areas

SUBPART D: ADDITIONAL REQUIREMENTS

Section
1000.401 Applicability
1000.402 Definitions
1000.403 Environmental Standards for Uranium Fuel Cycle

SUBPART E: RECORDS

Section
1000.501 Records
1000.502 Notification of Incidents
1000.503 Other Provisions

1000.APPENDIX A Concentrations in Air Above Natural Background

AUTHORITY: Implementing Section 25b and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/25b and 27].

SOURCE: Adopted in R82-2 at 9 Ill. Reg. 19391, effective December 4, 1985; amended in R82-2(B) at 10 Ill. Reg. 12938, effective July 21, 1986; amended in R18-28 at 46 Ill. Reg. _____, effective _____.

SUBPART A: GENERAL PROVISIONS

Section 1000.101 Authority

The Board adopts the rules contained in this title under the authority of Title VI-A of the Environmental Protection Act. [415 ILCS 5/25b]

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.102 Purpose

a) This Part establishes standards for protection against radiological air pollutants associated with materials and activities under licenses issued by the United States Nuclear Regulatory Commission (NRC) under the Atomic Energy Act of 1954 (42 U.S.C. 5801 *et seq.*), and the Energy Reorganization Act of 1974 (42 U.S.C. 5801 *et seq.*)

b) Persons subject to this Part must comply with this Part and make every effort to maintain radiation exposures in, and releases of radioactive materials to, unrestricted areas as low as is reasonably achievable. The term "as low as is reasonably achievable" means the lowest radiation exposure levels achievable considering the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, in relation to the utilization of atomic energy in the public interest.

c) Persons licensed by the NRC to operate light-water-cooled nuclear power reactors will satisfy subsection (b) if they achieve the design objectives and limiting conditions for operation specified in 10 CFR 50, Appendix I (1984), incorporated by reference in Section 1000.202.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.103 Scope

This Part applies to all persons who receive, possess, use, or transfer material licensed under 10 CFR 30 through 35, 40, or 70 (1984), incorporated by reference in Section 1000.202 or who are licensed to operate a production or utilization facility under 10 CFR 50 (1984), incorporated by reference in Section 1000.202.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

SUBPART B: DEFINITIONS

Section 1000.201 Definitions

Except as stated in this Section, or unless a different meaning of a word or term is clear from the context, the definition of words or terms in this Part will be the same as that applied to the same words or terms in the Environmental Protection Act [415 ILCS 5]:

"Act" means the Environmental Protection Act [415 ILCS 5/1 *et seq.*]

"Board" means the Illinois Pollution Control Board.

"Department" means the Illinois Department of Emergency Management Services Bureau of Nuclear Facility Safety.

"Dose" means the quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. Under this Part, a dose during a period of time means the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. The units of dose used in this Part are "Rad" and "Rem", as defined in this Section.

"Individual" means any human being.

"Licensed activity" means any activity engaged in under a general or specific license issued by the NRC.

"Licensed facility" means any facility constructed or operated under a permit or a general or specific license issued by the NRC.

"Licensed material" means any material received, possessed, used, or transferred under a general or specific license issued by the NRC.

"Licensee" means any person to whom a permit or a general or specific license has been issued by the NRC.

"NRC" means the United States Nuclear Regulatory Commission.

"Rad" means a measure of the dose of any radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue. (One millirad (mrad) = 0.001 rad).

"Radiation" means any or all of the following: alpha rays, beta rays, gamma rays,

X-rays, neutrons, highspeed electrons, high-speed protons, and other atomic particles; but not sound or radio waves, or visible, infrared, or ultraviolet light.

"Radioactive material" and "radioactive emissions" means any dusts, particulates, fumes, mists, vapors, or gases which spontaneously emit ionizing radiation.

"Rem" means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose received from an exposure to one roentgen of X-rays. (One millirem (mrem) = 0.001 rem). The relation of rem to other dose units depends upon the biological effect under consideration and upon the condition of irradiation. For this Part, any of the following is considered to be equivalent to a dose of one rem:

An exposure to one roentgen of X- or gamma radiation;

A dose of one rad due to X-, gamma, or beta radiation;

A dose of 0.1 rad due to neutrons or high energy protons;

A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, one rem of neutron radiation may be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if information is available to estimate with reasonable accuracy the approximate distribution in energy of neutrons, the incident number of neutrons per square centimeter equivalent to one rem may be estimated from the following table.

Neutron Flux Dose Equivalents

Neutron Energy (Mev)	No. of Neutron per square centimeter equivalent to a dose of 1 rem (neutrons/cm^2)	Average flux to deliver 100 millirem in 40 hours (neutron/cm^2 per second
Thermal	970×10^6	670
0.0001	720×10^6	500
0.005	820×10^6	570
0.02	400×10^6	280
0.1	120×10^6	80
0.5	43×10^6	30
1.0	26×10^6	18
2.5	29×10^6	20
5.0	26×10^6	18

7.5	24×10^6	17
10.0	24×10^6	17
10 to 30	14×10^6	10

"Restricted area" means any area, access to which is controlled by the licensee to protect individuals from exposure to radiation and radioactive materials. "Restricted area" must not include any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

"Unrestricted area" means any area access to which is not controlled by the licensee to protect, individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.202 Incorporations by Reference

The following materials are incorporated by reference. These incorporations by reference do not include any later amendments or editions:

a) Numerical Guides for Design Objectives and Limiting Conditions for Operations to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, 10 CFR 50, Appendix I (1984).

b) Rules of General Applicability to Domestic Licensing of Byproduct Material, 10 CFR 30 (1984).

c) General Domestic Licenses for Byproduct Material, 10 CFR 31 (1984).

d) Specific Domestic Licenses to Manufacture or Transfer Certain Items Containing Byproduct Material, 10 CFR 32 (1984).

e) Specific Domestic Licenses of Broad Scope for Byproduct Material, 10 CFR 33 (1984).

f) Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations, 10 CFR 34 (1984).

g) Medical Use of Byproduct Material, 10 CFR 35 (1984).

h) Domestic Licensing of Source Material, 10 CFR 40 (1984).

i) Domestic Licensing of Production and Utilization Facilities, 10 CFR 50 (1984).

j) Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 10 CFR 51 (1984).

k) Domestic Licensing of Special Nuclear Material, 10 CFR 70 (1984).

(Source: Added at 46 Ill. Reg. _____, effective _____)

SUBPART C: STANDARDS AND LIMITATIONS

Section 1000.301 Permissible Levels of Radiation in Unrestricted Areas

A person must not possess, use, receive, or transfer licensed material or engage in licensed activities as to create radiation levels in air in any unrestricted area:

a) That could result in an individual, when all radioactive emissions by the licensee are taken into account, receiving a dose to the whole body in excess of 0.5 rem in any one year;

b) That could result in an individual continuously present in the area, when all radioactive emissions by the licensee are taken into account, receiving a dose in excess of 2 millirems in any one hour; or

c) That could result in an individual continuously present in the area, when all radioactive emissions by licensee are taken into account, receiving a dose in excess of 100 millirems in any seven consecutive days.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.302 Radioactive Emissions to Unrestricted Areas

a) A person must not possess, use, receive, or transfer licensed material or engage in licensed activities so as to release to air in an unrestricted area radioactive material exceeding the concentration specified in Appendix A of. For this Section, concentrations of radioactive material may be averaged over a period not greater than one year.

b) For this Section, the concentration limits in Appendix A apply at the boundary of the restricted area. The concentration of radioactive material discharged through a stack, pipe or similar conduit may be determined for the point where the material leaves the conduit. If the conduit discharges within the restricted area, the concentration at the boundary may be determined by applying established factors for dilution, dispersion, or decay between the point of discharge and the

boundary.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

SUBPART D: ADDITIONAL REQUIREMENTS

Section 1000.401 Applicability

This Subpart applies to radiation doses received by members of the public in the general environment and to radioactive materials introduced into the general environment due to operations which are part of a nuclear fuel cycle.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.402 Definitions

As used in this Subpart:

"Curie" (Ci) means that quantity of radioactive material producing 37 billion nuclear transformations per second. (One millicurie (mCi)=0.001 Ci.)

"Dose equivalent" means the product of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation and its spatial distribution in the body. The unit of dose equivalent is the "rem." (One millirem (mrem) = 0.001 rem.)

"General environment" means the total terrestrial, atmospheric and aquatic environments outside sites upon which any operation which is part of a nuclear fuel cycle is conducted.

"Gigawatt-year" refers to the quantity of electrical energy produced at the busbar of a generating station. A gigawatt is equal to one billion watts. A gigawatt-year is equivalent to the amount of energy output represented by an average electric power level of one gigawatt sustained for one year.

"Member of the public" means any person that can receive a radiation dose in the general environment, whether the person may or may not also be exposed to radiation in an occupation associated with a nuclear fuel cycle. However, a person is not considered a member of the public during any period in which that person is engaged in carrying out any operation which is part of a nuclear fuel cycle.

"Nuclear fuel cycle" means the operations associated with the production of electrical power for public use by any fuel cycle through utilization of nuclear energy.

"Organ" means any human organ exclusive of the dermis, the epidermis, or the cornea.

"Site" means the area contained within the boundary of a location under the control of persons possessing or using radioactive material on which is conducted one or more operations covered by this Part.

"Uranium fuel cycle" means the operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel, to the extent that these directly support the production of electrical power for public use utilizing nuclear energy, but excludes mining operations, operations at waste disposal sites, transportation of any radioactive material in support of these operations, and the reuse of recovered nonuranium special nuclear and by-product materials from the cycle.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.403 Environmental Standards for Uranium Fuel Cycle

A person conducting operations covered by this Subpart must assure that:

a) The annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as the result of exposures to planned discharges of radioactive materials, radon and its daughters excepted, to the general environment from uranium fuel cycle operations and to radiation from these operations.

b) The total quantity of radioactive materials entering the general environment from the entire uranium fuel cycle, per gigawatt-year of electrical energy produced by the fuel cycle, contains less than 50,000 curies of krypton-85, 5 millicuries of iodine-129, and 0.5 millicuries combined of plutonium-239 and other alpha-emitting transuranic radionuclides with the halflives greater than one year.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

SUBPART E: RECORDS

Section 1000.501 Records

A person subject to this Part must submit to the Department, for any material or facility permitted or licensed by the NRC or for which an NRC permit or license is sought:

a) Preliminary Safety Analysis Report and Final Safety Analysis Report, as described in 10 CFR 50.34, incorporated by reference in Section 1000.202.

b) Application for Construction Permit and for all amendments, including information required by 10 CFR 50.34a, 50.36, and 51.20, incorporated by reference in Section 1000.202.

c) Environmental Impact Appraisal, Draft and Final Environmental Impact Statement, Negative Declaration, or other document prepared by the NRC under 10 CFR 51, incorporated by reference in Section 1000.202.

d) Operating Permit and all amendments thereto, including Technical Specifications under 10 CFR 50.36a, incorporated by reference in Section 1000.202.

e) Application for Amendment to Operating License.

f) All data, records, and reports submitted to the NRC for determining or predicting radiation levels in air in unrestricted areas or the type or amount of radioactive materials emitted into air conducted by or for such persons.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.502 Notification of Incidents

A person subject to this Part must immediately notify by telephone the Illinois Emergency Management Agency (IEMA) of any incident or condition arising from the use or possession of licensed materials or facilities or the conducting of licensed activities which may have caused or threatens to cause emissions or radiation levels in excess of those allowed under this Part. IEMA's 24-hour Operations Center can be reached for notification of incidents at 1-800-782-7860, or, if calling from outside Illinois, 1-217-782-7860.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.503 Other Provisions

a) The definitions specified in 35 Ill. Adm. Code 201.102 apply to this Part.

b) All persons subject to this Part are subject to the requirements and provisions of 35 Ill. Adm. Code 201.122, 201.123, 201.125, 201.126, 201.141, 201.150 and 201.151.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

379 **Section 1000.APPENDIX A Concentrations in Air Above Natural Background**
380

Element (atomic number)	Isotope[1]		µCi/ml
Actinium (89)	AC227	S	8×10^{-14}
		I	9×10^{-13}
	AC 228	S	3×10^{-9}
		I	6×10^{-10}
Americium (95)	Am 241	S	2×10^{-13}
		I	4×10^{-12}
	Am 242m	S	Am 242mS2 $\times 10^{-13}$
		I	9×10^{-12}
	Am 242	S	1×10^{-9}
		I	2×10^{-9}
	Am 243	S	2×10^{-13}
		I	4×10^{-12}
	Am 244	S	1×10^{-7}
		I	8×10^{-7}
Antimony	Sb 122	S	6×10^{-9}
		I	5×10^{-9}
	Sb 124	S	5×10^{-9}
		I	7×10^{-10}
	Sb 125	S	2×10^{-8}
		I	9×10^{-10}
Argon (18)	A 37	Sub[2]	1×10^{-4}
	A 41	Sub	4×10^{-8}
Arsenic (33)	As 73	S	7×10^{-8}
		I	1×10^{-8}
	As 74	S	1×10^{-8}
		I	4×10^{-9}
	As 76	S	4×10^{-9}
		I	3×10^{-9}
	As 77	S	2×10^{-8}
		I	1×10^{-8}
Astatine (85)	At 211	S	2×10^{-10}
		I	1×10^{-9}
Barium (56)	Ba 131	S	4×10^{-8}
		I	1×10^{-8}
	Ba 140	S	4×10^{-9}
		I	1×10^{-9}
Berkelium (97)	Bk 249	S	3×10^{-11}
		I	4×10^{-9}
	Bk 250	S	5×10^{-9}

		I	4×10^{-8}
Berylium (4)	Be 7	S	2×10^{-7}
		I	4×10^{-8}
Bismuth (83)	Bi 206	S	6×10^{-9}
		I	5×10^{-9}
	Bi 207	S	6×10^{-9}
		I	5×10^{-10}
	Bi 210	S	2×10^{-10}
		I	2×10^{-10}
	Bi 212	S	3×10^{-9}
		I	7×10^{-9}
Bromine (35)	Br 82	S	4×10^{-8}
		I	6×10^{-9}
Cadmium (48)	Cd 109	S	2×10^{-9}
		I	3×10^{-9}
	Cd 115m	S	1×10^{-9}
		I	1×10^{-9}
	Cd 115	S	8×10^{-9}
		I	6×10^{-9}
Calcium (20)	Ca 45	S	1×10^{-9}
		I	4×10^{-9}
	Ca 47	S	6×10^{-9}
		I	6×10^{-9}
Californium (98)	Cf 249	S	5×10^{-14}
		I	3×10^{-12}
	Cf 250	S	2×10^{-13}
		I	3×10^{-12}
	Cf 251	S	6×10^{-14}
		I	3×10^{-12}
	Cf 252	S	2×10^{-13}
		I	1×10^{-12}
	Cf 253	S	3×10^{-11}
		I	3×10^{-11}
	Cf 254	S	2×10^{-13}
		I	2×10^{-13}
Carbon (6)	C 14	S	1×10^{-7}
	(CO_2)	Sub	1×10^{-6}
Cerium (58)	Ce 141	S	2×10^{-8}
		I	5×10^{-9}
	Ce 143	S	9×10^{-9}
		I	7×10^{-9}
	Ce 144	S	3×10^{-10}
		I	2×10^{-10}
Cesium (55)	Cs 131	S	4×10^{-7}

		I	1×10^{-7}
	Cs 134m	S	1×10^{-6}
		I	2×10^{-7}
	Cs 134	S	1×10^{-9}
		I	4×10^{-10}
	Cs 135	S	2×10^{-8}
		I	3×10^{-9}
	Cs 136	S	1×10^{-8}
		I	6×10^{-9}
	Cs 137	S	2×10^{-9}
		I	5×10^{-10}
Chlorine (17)	C1 36	S	1×10^{-8}
		I	8×10^{-10}
	C1 38	S	9×10^{-8}
		I	7×10^{-8}
Chromium (24)	Cr 51	S	4×10^{-7}
		I	8×10^{-8}
Cobalt (27)	Co 57	S	1×10^{-7}
		I	6×10^{-9}
	Co 58m	S	6×10^{-7}
		I	3×10^{-7}
	Co 58	S	3×10^{-8}
		I	2×10^{-9}
	Co 60	S	1×10^{-8}
		I	3×10^{-10}
Copper (29)	Cu 64	S	7×10^{-8}
		I	4×10^{-8}
Curium (96)	Cm 242	S	4×10^{-12}
		I	6×10^{-12}
	Cm 243	S	2×10^{-13}
		I	3×10^{-12}
	Cm 244	S	3×10^{-13}
		I	3×10^{-12}
	Cm 245	S	2×10^{-13}
		I	4×10^{-12}
	Cm 246	S	2×10^{-13}
		I	4×10^{-12}
	Cm 247	S	2×10^{-13}
		I	4×10^{-12}
	Cm 248	S	2×10^{-14}
		I	4×10^{-13}
	Cm 249	S	4×10^{-7}
		I	4×10^{-7}
Dysprosium (66)	Dy 165	S	9×10^{-8}

		I	7×10^{-8}
	Dy 166	S	8×10^{-9}
		I	7×10^{-9}
Einsteinium (99)	Es 253	S	3×10^{-11}
		I	2×10^{-11}
	Es 254m	S	2×10^{-10}
		I	2×10^{-10}
	Es 254	S	6×10^{-13}
		I	4×10^{-12}
	Es 255	S	2×10^{-11}
		I	1×10^{-11}
Erbium (68)	Er 169	S	2×10^{-8}
		I	1×10^{-8}
	Er 171	S	2×10^{-8}
		I	2×10^{-8}
Europium (63)	Eu 152	S	1×10^{-8}
	(T/2=9.2 hrs)	I	1×10^{-8}
	Eu 152	S	4×10^{-10}
	(T/2=13 yrs)	I	6×10^{-10}
	Eu 154	S	1×10^{-10}
		I	2×10^{-10}
	Eu 155	S	3×10^{-9}
		I	3×10^{-9}
Fermium (100)	Fm 254	S	2×10^{-9}
		I	2×10^{-9}
	Fm 255	S	6×10^{-10}
		I	4×10^{-10}
	Fm 256	S	1×10^{-10}
		I	6×10^{-11}
Fluorine (9)	F 18	S	2×10^{-7}
		I	9×10^{-8}
Gadolinium (64)	Gd 153	S	8×10^{-9}
		I	3×10^{-9}
	Gd 159	S	2×10^{-8}
		I	1×10^{-8}
Gallium (31)	Ga 72	S	8×10^{-9}
		I	6×10^{-9}
Germanium (32)	Ge 71	S	4×10^{-7}
		I	2×10^{-7}
Gold (79)	Au 196	S	4×10^{-8}
		I	2×10^{-8}
	Au 198	S	1×10^{-8}
		I	8×10^{-9}
	Au 199	S	4×10^{-8}

		I	3×10^{-8}
Hafnium (72)	Hf 181	S	1×10^{-9}
		I	3×10^{-9}
Holmium (67)	Ho 166	S	$7x\ 10^{-9}$
		I	6×10^{-9}
Hydrogen (1)	H3	S	2×10^{-7}
		I	$2x10^{-7}$
		Sub	4×10^{-5}
Indium (49)	In 113m	S	3×10^{-7}
		I	2×10^{-7}
	In 114m	S	4×10^{-9}
		I	7×10^{-10}
	In 115m	S	8×10^{-8}
		I	6×10^{-8}
	In 115	S	9×10^{-9}
		I	1×10^{-9}
Iodine (53)	I 125	S	8×10^{-11}
		I	6×10^{-9}
	I 126	S	9×10^{-11}
		I	1×10^{-8}
	I 129	S	2×10^{-11}
		I	2×10^{-9}
	I 131	S	1×10^{-10}
		I	1×10^{-8}
	I 132	S	3×10^{-9}
		I	3×10^{-8}
	I 133	S	4×10^{-10}
		I	7×10^{-9}
	I 134	S	6×10^{-9}
		I	1×10^{-7}
	I 135	S	1×10^{-9}
		I	1×10^{-8}
Iridium (77)	Ir 190	S	4×10^{-8}
		I	1×10^{-8}
	Ir 192	S	4×10^{-9}
		I	9×10^{-10}
	Ir 194	S	8×10^{-9}
		I	5×10^{-9}
Iron (26)	Fe 55	S	3×10^{-8}
		I	3×10^{-8}
	Fe 59	S	5×10^{-9}
		I	2×10^{-9}
Krypton (36)	Kr 85m	Sub	$1x\ 10^{-7}$
	Kr 85	Sub	3×10^{-7}

	Kr 87	Sub	2×10^{-8}
	Kr 88	Sub	2×10^{-8}
Lanthanum (57)	La 140	S	$5x\ 10^{-9}$
		I	4×10^{-9}
Lead (82)	Pb 203	S	$9x\ 10^{-8}$
		I	6×10^{-8}
	Pb 210	S	$4x\ 10^{-12}$
		I	8×10^{-12}
	Pb 212	S	6×10^{-10}
		I	7×10^{-10}
Lutetium (71)	Lu 177	S	2×10^{-8}
		I	2×10^{-8}
Manganese (25)	Mn 52	S	7×10^{-9}
		I	5×10^{-9}
	Mn 54	S	1×10^{-8}
		I	1×10^{-9}
	Mn 56	S	3×10^{-8}
		I	2×10^{-8}
Mercury (80)	Hg 197m	S	3×10^{-8}
		I	3×10^{-8}
	Hg 197	S	4×10^{-8}
		I	9×10^{-8}
	Hg 203	S	2×10^{-9}
		I	4×10^{-9}
Molybdenum (42)	Mo 99	S	3×10^{-8}
		I	7×10^{-9}
Neodymium (60)	Nd 144	S	3×10^{-12}
		I	1×10^{-11}
	Nd 147	S	1×10^{-8}
		I	8×10^{-9}
	Nd 149	S	6×10^{-8}
		I	5×10^{-8}
Neptunium (93)	Np 237	S	1×10^{-13}
		I	4×10^{-12}
	Np 239	S	3×10^{-8}
		I	2×10^{-8}
Nickel (28)	Ni 59	S	2×10^{-8}
		I	3×10^{-8}
	Ni 63	S	2×10^{-9}
		I	1×10^{-8}
	Ni 65	S	3×10^{-8}
		I	2×10^{-8}
Niobium (Columbium)(41)	Nb 93m	S	4×10^{-9}

		I	5×10^{-9}
	Nb 95	S	2×10^{-8}
		I	3×10^{-9}
	Nb 97	S	2×10^{-7}
		I	2×10^{-7}
Osmium (76)	Os 185	S	2×10^{-8}
		I	2×10^{-9}
	Os 191m	S	6×10^{-7}
		I	3×10^{-7}
	Os 191	S	4×10^{-8}
		I	1×10^{-8}
	Os 193	S	1×10^{-8}
		I	9×10^{-9}
Palladium (46)	Pd 103	S	5×10^{-8}
		I	3×10^{-8}
	Pd 109	S	2×10^{-8}
		I	1×10^{-8}
Phosphorus (15)	P 32	S	2×10^{-9}
		I	3×10^{-9}
Platinum (78)	Pt 191	S	3×10^{-8}
		I	2×10^{-8}
	Pt 193m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 193	S	4×10^{-8}
		I	1×10^{-8}
	Pt 197m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 197	S	3×10^{-8}
		I	2×10^{-8}
Plutonium (94)	Pu 238	S	7×10^{-14}
		I	1×10^{-12}
	Pu 239	S	6×10^{-14}
		I	1×10^{-12}
	Pu 240	S	6×10^{-14}
		I	1×10^{-12}
	Pu 241	S	3×10^{-12}
		I	1×10^{-9}
	Pu 242	S	6×10^{-14}
		I	1×10^{-12}
	Pu 243	S	6×10^{-8}
		I	8×10^{-8}
	Pu 244	S	6×10^{-14}
		I	1×10^{-12}
Polonium (84)	Po 210	S	2×10^{-11}

		I	7×10^{-12}
Potassium (19)	K 42	S	7×10^{-8}
		I	4×10^{-9}
Praseodymium (59)	Pr 142	S	7×10^{-9}
		I	5×10^{-9}
	Pr 143	S	1×10^{-8}
		I	6×10^{-9}
Promethium (61)	Pm 147	S	2×10^{-9}
		I	3×10^{-9}
	Pm 149	S	1×10^{-8}
		I	8×10^{-9}
Protoactinium (91)	Pa 230	S	6×10^{-11}
		I	3×10^{-11}
	Pa 231	S	4×10^{-14}
		I	4×10^{-12}
	Pa 233	S	2×10^{-8}
		I	6×10^{-9}
Radium (88)	Ra 223	S	6×10^{-11}
		I	8×10^{-12}
	Ra 224	S	2×10^{-10}
		I	2×10^{-11}
	Ra 226	S	3×10^{-12}
		I	2×10^{-12}
	Ra 228	S	2×10^{-12}
		I	1×10^{-12}
Radon (86)	Rn 220	S	1×10^{-8}
	Rn 222[3]	3×10^{-9}	3×10^{-9}
Rhenium (75)	Re 183	S	9×10^{-8}
		I	5×10^{-9}
	Re 186	S	2×10^{-8}
		I	8×10^{-9}
	Re 187	S	3×10^{-7}
		I	2×10^{-8}
	Re 188	S	1×10^{-8}
		I	6×10^{-9}
Rhodium (45)	Rh 103m	S	3×10^{-6}
		I	2×10^{-6}
	Rh 105	S	3×10^{-8}
		I	2×10^{-8}
Rubidium (37)	Rb 86	S	1×10^{-8}
		I	2×10^{-9}
	Rb 87	S	2×10^{-8}
		I	2×10^{-9}
Ruthenium (44)	Ru 97	S	8×10^{-8}

		I	6×10^{-8}
	Ru 103	S	2×10^{-8}
		I	3×10^{-9}
	Ru 105	S	2×10^{-8}
		I	2×10^{-8}
	Ru 106	S	3×10^{-9}
		I	2×10^{-10}
Samarium (62)	Sm 147	S	2×10^{-12}
		I	9×10^{-12}
	Sm 151	S	2×10^{-9}
		I	5×10^{-9}
	Sm 153	S	2×10^{-8}
		I	1×10^{-8}
Scandium (21)	Sc 46	S	8×10^{-9}
		I	8×10^{-10}
	Sc 47	S	2×10^{-8}
		I	2×10^{-8}
	Sc 48	S	6×10^{-9}
		I	5×10^{-9}
Selenium (34)	Se 75	S	4×10^{-8}
		I	4×10^{-9}
Silicon (14)	Si 31	S	2×10^{-7}
		I	3×10^{-8}
Silver (47)	Ag 105	S	2×10^{-8}
		I	3×10^{-9}
	Ag 110m	S	7×10^{-9}
		I	3×10^{-10}
	Ag 111	S	1×10^{-8}
		I	8×10^{-9}
Sodium (11)	Na 22	S	6×10^{-9}
		I	3×10^{-10}
	Na 24	S	4×10^{-8}
		I	5×10^{-9}
Strontium (38)	Sr 85m	S	1×10^{-6}
		I	1×10^{-6}
	Sr 85	S	8×10^{-9}
		I	4×10^{-9}
	Sr 89	S	3×10^{-10}
		I	1×10^{-9}
	Sr 90	S	3×10^{-11}
		I	2×10^{-10}
	Sr 91	S	2×10^{-8}
		I	9×10^{-9}
	Sr 92	S	2×10^{-8}

		I	1×10^{-8}
Sulfur (16)	S 35	S	9×10^{-9}
		I	9×10^{-9}
Tantalum (73)	Ta 182	S	1×10^{-9}
		I	7×10^{-10}
Technetium (43)	Tc 96m	S	3×10^{-6}
		I	1×10^{-6}
	Tc 96	S	2×10^{-8}
		I	8×10^{-9}
	Tc 97m	S	8×10^{-8}
		I	5×10^{-9}
	Tc 97	S	4×10^{-7}
		I	1×10^{-8}
	Tc 99m	S	1×10^{-6}
		I	5×10^{-7}
	Tc 99	S	7×10^{-8}
		I	2×10^{-9}
Tellurium (52)	Te 125m	S	1×10^{-8}
		I	4×10^{-9}
	Te 127m	S	5×10^{-9}
		I	1×10^{-9}
	Te 127	S	6×10^{-8}
		I	3×10^{-8}
	Te 129m	S	3×10^{-9}
		I	1×10^{-9}
	Te 129	S	2×10^{-7}
		I	1×10^{-7}
	Te 131m	S	1×10^{-8}
		I	6×10^{-9}
	Te 132	S	7×10^{-9}
		I	4×10^{-9}
Terbium (65)	Tb 160	S	3×10^{-9}
		I	1×10^{-9}
Thallium (81)	Tl 200	S	9×10^{-8}
		I	4×10^{-8}
	Tl 201	S	7×10^{-8}
		I	3×10^{-8}
	Tl 202	S	3×10^{-8}
		I	8×10^{-9}
	Tl 204	S	2×10^{-8}
		I	9×10^{-10}
Thorium (90)	Th 227	S	1×10^{-11}
		I	6×10^{-12}
	Th 228	S	3×10^{-13}

		I	2×10^{-13}
	Th 230	S	8×10^{-14}
		I	3×10^{-13}
	Th 231	S	5×10^{-8}
		I	4×10^{-8}
	Th 232	S	1×10^{-12}
		I	1×10^{-12}
	Th natural	S	2×10^{-12}
		I	2×10^{-12}
	Th 234	S	2×10^{-9}
		I	1×10^{-9}
Thulium (69)	Tm 170	S	1×10^{-9}
		I	1×10^{-9}
	Tm 171	S	4×10^{-9}
		I	8×10^{-9}
Tin (50)	Sn 113	S	1×10^{-8}
		I	2×10^{-9}
	Sn 125	S	4×10^{-9}
		I	3×10^{-9}
Tungsten (Wolfram) (74)	W 181	S	8×10^{-8}
		I	4×10^{-9}
	W 185	S	3×10^{-8}
		I	4×10^{-9}
	W 187	S	2×10^{-8}
		I	1×10^{-8}
Uranium (92)	U 230	S	1×10^{-11}
		I	4×10^{-12}
	U 232	S	3×10^{-12}
		I	9×10^{-13}
	U 233	S	2×10^{-11}
		I	4×10^{-12}
	U 234	S[4]	2×10^{-11}
		I	4×10^{-12}
	U 235	S[4]	2×10^{-11}
		I	4×10^{-12}
	U 236	S	2×10^{-11}
		I	4×10^{-12}
	U 238	S[4]	3×10^{-12}
		I	5×10^{-12}
	U 240	S	8×10^{-9}
		I	6×10^{-9}
	U-natural	S[4]	5×10^{-12}
		I	5×10^{-12}
Vanadium (23)	V 48	S	6×10^{-9}

		I	2×10^{-9}
Xenon (54)	Xe 131m	Sub	4×10^{-7}
	Xe 133	Sub	3×10^{-7}
	Xe 133m	Sub	3×10^{-7}
	Xe 135	Sub	1×10^{-7}
Ytterbium (70)	Yb 175	S	2×10^{-8}
		I	2×10^{-8}
Yttrium (39)	Y 90	S	4×10^{-9}
		I	3×10^{-9}
	Y 91m	S	8×10^{-7}
		I	6×10^{-7}
	Y 91	S	1×10^{-9}
		I	1×10^{-9}
	Y 92	S	1×10^{-8}
		I	1×10^{-8}
	Y 93	S	6×10^{-9}
		I	5×10^{-9}
Zinc (30)	Zn 65	S	4×10^{-9}
		I	2×10^{-9}
	Zn 69m	S	1×10^{-8}
		I	1×10^{-8}
	Zn 69	S	2×10^{-7}
		I	3×10^{-7}
Zirconium (40)	Zr 93	S	4×10^{-9}
		I	1×10^{-8}
	Zr 95	S	4×10^{-9}
		I	1×10^{-9}
	Zr 97	S	4×10^{-9}
		I	3×10^{-9}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio- active half-life less than 2 hours.		Sub	3×10^{-6}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio- active half-			1×10^{-10}

life greater than 2 hours.

Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.	2×10^{-14}

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

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

[3]These radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. The 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.

[4]For soluble mixtures of U-238, U-234 and U-235 in air chemical toxicity may be the limiting factor. 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 U. The specific activity (SA) for other mixtures of U-238, U-235 and U-234, if not known, will be:

$SA = 3.6 \times 10^{-7}$ 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: Where a mixture in air of more than one radionuclide exists, the limiting values of this Appendix 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 Appendix A for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity").

   EXAMPLE: If radionuclides A, B, and C are present in concentrations C_A, C_B, C_C, and if the applicable MPC's are MPC_A, and MPC_B, and MPC_C respectively, then the

concentrations must be limited so that the following relationship exists:

$$(C_A/MPC_A) + (C_B/MPC_B) + (C_C/MPC_C) \leq 1$$

2. If either the identity or the concentration of any radionuclide in the mixture is not known the limiting values of Appendix A must be 2×10^{-14}.

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 Appendix A 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 radionuclides specified in Appendix A are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in Appendix A for any radionuclide which is not known to be absent from the mixture; or

c. Element (atomic number) and isotope. µCi/ml

If it is known that alpha-emitters and Sr 90, I 129, Pb 210, Ac 227, Ra 228, Pa 230, Pu 241, and Bk are not present.	1×10^{-10}
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present.	1×10^{-11}
If it is known that alpha-emitters and Ac 227 are not present.	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.	1×10^{-13}

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

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 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 (CA) to the concentration limit for that radionuclide specified in Appendix A (MPCA) does not exceed 1/10 (i.e., CA/MPCA ≤ than 1/10), and

b. the sum of such ratios for all the radionuclides considered as not present in the mixtures does not exceed 1/4, (i.e., (CA/MPCA + CB/MPCB + < than 1/4).

(Source: Amended at 46 Ill. Reg. _____, effective _____)

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE I: ATOMIC RADIATION
CHAPTER I: POLLUTION CONTROL BOARD

PART 1000
RADIATION HAZARDS

SUBPART A: GENERAL PROVISIONS

SUBPART B: DEFINITIONS

SUBPART C: STANDARDS AND LIMITATIONS

SUBPART D: ADDITIONAL REQUIREMENTS

SUBPART E: RECORDS

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

381000.503 Other Provisions
39
401000.APPENDIX A Concentrations in Air Above Natural Background
41
42AUTHORITY: Implementing Section 25~~(~~b~~)~~ and authorized by Section 27 of the Environmental
43Protection Act [415 ILCS 5/25~~(~~b~~)~~ and 27].
44
45SOURCE: Adopted in R82-2 at 9 Ill. Reg. 19391, effective December 4, 1985; amended in
46R82-2(B) at 10 Ill. Reg. 12938, effective July 21, 1986; amended in R18-28 at 46 Ill. Reg.
47_____~~—~~, effective _____.
48
49 SUBPART A: GENERAL PROVISIONS
50
51**Section 1000.101 Authority**
52
53The ~~Pollution Control~~ Board adopts the rules ~~and regulations~~ contained in this title under
54~~pursuant to~~ the authority of Title VI-A of the Environmental Protection Act. [415 ILCS 5/25~~(~~b~~)~~].~~.~~
55~~(Ill. Rev. Stat. 1983, ch. 111 1/2, par. 1025(b)).~~
56
57 (Source: Amended at 46 Ill. Reg.~~—~~ _____, effective _____)
58
59**Section 1000.102 Purpose ~~and Policy~~**
60
61 a) ~~This~~~~The regulations in this~~This Part establishes ~~establish~~ standards for protection
62 against radiological air pollutants associated with materials and activities under
63 licenses issued by the United States Nuclear Regulatory Commission (NRC)
64 under ~~pursuant to~~ the Atomic Energy Act of 1954 (42 U.S.C. 5801 *et seq.*) ~~as~~
65 ~~amended~~, and the Energy Reorganization Act of 1974 (42 U.S.C. 5801 *et seq.*)
66
67 b) Persons ~~It is the policy of the Pollution Control Board that persons~~ subject to this
68 Part must ~~shall, in addition to~~ comply ~~complying~~ with ~~the requirements of~~ this
69 Part and~~;~~ make every ~~reasonable~~ effort to maintain radiation exposures in, and
70 releases of radioactive materials to, unrestricted areas as low as is reasonably
71 achievable. The term "as low as is reasonably achievable" means the lowest
72 radiation exposure levels ~~as low as is reasonably~~ achievable ~~consideringtaking~~
73 ~~into account~~considering the state of technology, the economics of improvements
74 in relation to benefits to the public health and safety, and other societal and
75 socioeconomic considerations, in relation to the utilization of atomic energy in the

public interest.

c) Persons licensed by the NRC ~~United States Nuclear Regulatory Commission~~ to operate light-water-cooled nuclear power reactors ~~will~~~~shall be deemed to~~will satisfy ~~the requirements of this~~ subsection (b) if they achieve the design objectives and limiting conditions for operation specified ~~set out~~ in 10 CFR 50, Appendix I (1984), incorporated by reference in Section 1000.202. ~~This Part incorporates no further amendments or editions to those objectives and conditions for operation.~~

(Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

Section 1000.103 Scope

~~This~~~~The requirements of this~~This Part applies ~~apply~~ to all persons who receive, possess, use, or transfer material licensed ~~under~~~~pursuant to Parts~~under 10 CFR 30 through 35, 40, or 70 (1984), incorporated by reference in Section 1000.202 or who are licensed to operate a production or utilization facility ~~under~~~~pursuant to~~under 10 CFR 50 (1984), incorporated by reference in Section 1000.202. ~~of the regulations of the United States Nuclear Regulatory Commission.~~

(Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

SUBPART B: DEFINITIONS

Section 1000.201 Definitions

Except as stated in this Section, or unless a different meaning of a word or term is clear from the context, the definition of words or terms in this Part will be the same as that applied to the same words or terms in the Environmental Protection Act [415 ILCS 5] ~~As used in this Part~~:

"Act" means the Environmental Protection Act~~,~~ [415 ILCS 5/1 ~~Ill. Rev. Stat., 1983, ch. 111 1/2, pars 1001~~ *et seq.*]

"Board" means the Illinois Pollution Control Board.

"Department" means the Illinois Department of Emergency Management Services Bureau of Nuclear Facility Safety.

"Dose" means the quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. Under this Part, ~~When these regulations specify~~ a dose during a period of time~~, the dose~~ means the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. ~~Several different units of dose are in current use.~~ The ~~Definitions of~~ units of dose ~~as~~ used in this Part ~~these regulations are set forth in the definitions of~~are "Rad" and "Rem",~~"~~ as defined in this Section.

"Individual" means any human being.

"Licensed activity" means any activity engaged in under a general or specific license issued by the NRC.

"Licensed facility" means any facility constructed or operated under a permit or a general or specific license issued by the NRC.

"Licensed material" means any material received, possessed, used, or transferred under a general or specific license issued by the NRC.

"Licensee" means any person to whom a permit or a general or specific license has been issued by the NRC.

"NRC" means the United States Nuclear Regulatory Commission.

"Rad" means a measure of the dose of any radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue. (One millirad (mrad) = 0.001 rad).

"Radiation" means any or all of the following: alpha rays, beta rays, gamma rays,

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

X-rays, neutrons, high-speed electrons, high-speed protons, and other atomic particles; but not sound or radio waves, or visible, infrared, or ultraviolet light.

"Radioactive material" and "radioactive emissions" means any dusts, particulates, fumes, mists, vapors, or gases which spontaneously emit ionizing radiation.

"Rem" means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose received from an exposure to one roentgen of X-rays. (One millirem (mrem) = 0.001 rem). The relation of rem to other dose units depends upon the biological effect under consideration and upon the condition of irradiation. For ~~the purpose of~~ this Part, any of the following is considered to be equivalent to a dose of one rem:

An exposure to one roentgen of X- or gamma radiation;

A dose of one rad due to X-, gamma, or beta radiation;

A dose of 0.1 rad due to neutrons or high energy protons;

A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, one rem of neutron radiation may ~~for purposes of this Part~~ be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if ~~there exists sufficient~~ information is available to estimate with reasonable accuracy the approximate distribution in energy of neutrons, the incident number of neutrons per square centimeter equivalent to one rem may be estimated from the following table.

~~Neutron Flux Dose Equivalents~~

~~Neutron energy (Mev)~~	~~No. of Neutron per square centimeter equivalent to a dose of 1 rem (neutrons/cm^2)~~	~~Average flux to deliver 100 millirem in 40 hours (neutrons/cm^2) per second~~

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

~~Thermal 970 x 10^6 670~~
~~0.0001 720 x 10^6 500~~
~~0.005 820 x 10^6 570~~
~~0.02 400 x 10^6 280~~
~~0.1 120 x 10^6 80~~
~~0.5 43 x 10^6 30~~
~~1.0 26 x 10^6 18~~
~~2.5 29 x 10^6 20~~
~~5.0 26 x 10^6 18~~
~~7.5 24 x 10^6 17~~
~~10.0 24 x 10^6 17~~
~~10 to 30 14 x 10^6 10~~

Neutron Flux Dose Equivalents

Neutron Energy (Mev)	No. of Neutron per square centimeter equivalent to a dose of 1 rem (neutrons/cm^2)	Average flux to deliver 100 millirem in 40 hours (neutron/cm^2 per second
Thermal	970 x 10^6	670
0.0001	720 x 10^6	500
0.005	820 x 10^6	570
0.02	400 x 10^6	280
0.1	120 x 10^6	80
0.5	43 x 10^6	30
1.0	26 x 10^6	18
2.5	29 x 10^6	20
5.0	26 x 10^6	18
7.5	24 x 10^6	17
10.0	24 x 10^6	17
10 to 30	14 x 10^6	10

"Restricted area" means any area, access to which is controlled by the licensee to protect ~~for purposes of protection of~~ individuals from exposure to radiation and radioactive materials. "Restricted area" must ~~shall~~ not include any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

"Unrestricted area" means any area access to which is not controlled by the licensee to protect ~~for purposes of protection of~~, individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

(Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

Section 1000.202 Incorporations by Reference

The following materials are incorporated by reference. These incorporations by reference do not include any later amendments or editions:

a) Numerical Guides for Design Objectives and Limiting Conditions for Operations to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, 10 CFR 50, Appendix I (1984).

b) Rules of General Applicability to Domestic Licensing of Byproduct Material, 10 CFR 30 (1984).

c) General Domestic Licenses for Byproduct Material, 10 CFR 31 (1984).

d) Specific Domestic Licenses to Manufacture or Transfer Certain Items Containing Byproduct Material, 10 CFR 32 (1984).

e) Specific Domestic Licenses of Broad Scope for Byproduct Material, 10 CFR 33 (1984).

f) Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations, 10 CFR 34 (1984).

g) Medical Use of Byproduct Material, 10 CFR 35 (1984).

h) Domestic Licensing of Source Material, 10 CFR 40 (1984).

i) Domestic Licensing of Production and Utilization Facilities, 10 CFR 50 (1984).

j) Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 10 CFR 51 (1984).

k) Domestic Licensing of Special Nuclear Material, 10 CFR 70 (1984).

(Source: Added at 46 Ill. Reg. _____, effective _____)

SUBPART C: STANDARDS AND LIMITATIONS

Section 1000.301 Permissible Levels of Radiation in Unrestricted Areas

A ~~No~~ person must not ~~is allowed to shall~~ possess, use, receive, or transfer licensed material or engage in licensed activities ~~in such manner~~ as to create radiation levels in air in any unrestricted area:

a) That could result in an ~~Radiation levels in air such~~ individual, ~~would be likely;~~ when all radioactive emissions by the licensee are taken into account, receiving ~~to receive~~ a dose to the whole body in excess of 0.5 rem in any one year;

b) That could result in ~~Radiation levels in air which, if~~ an individual ~~were~~ continuously present in the area, ~~could result,~~ when all radioactive emissions by the licensee are taken into account, ~~in his~~ receiving a dose in excess of 2 millirems in any one hour; or

c) That could result in ~~Radiation levels in air which, if~~ an individual ~~were~~ continuously present in the area~~, could result~~, when all radioactive emissions by licensee are taken into account, ~~in his~~ receiving a dose in excess of 100 millirems in any seven consecutive days.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

Section 1000.302 Radioactive Emissions to Unrestricted Areas

a) A ~~No~~ person must not ~~shall~~ possess, use, receive, or transfer licensed material or engage in licensed activities so as to release to air in an unrestricted area radioactive material exceeding the concentration ~~in concentrations which exceed the limits~~ specified in Appendix A of ~~this Part~~. For ~~purposes of~~ this Section, concentrations of radioactive material may be averaged over a period not greater

than one year.

b) For ~~the purpose of~~ this ~~Section~~~~section~~Section, the concentration limits in Appendix A ~~of this Part shall~~ apply at the boundary of the restricted area. The concentration of radioactive material discharged through a stack, pipe or similar conduit may be determined for ~~with respect to~~ the point where the material leaves the conduit. If the conduit discharges within the restricted area, the concentration at the boundary may be determined by applying established factors for dilution, dispersion, or decay between the point of discharge and the boundary.

(Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

SUBPART D: ADDITIONAL REQUIREMENTS

Section 1000.401 Applicability

~~The provisions of~~ This ~~this Subpart~~~~part~~Subpart applies ~~apply~~ to radiation doses received by members of the public in the general environment and to radioactive materials introduced into the general environment due to ~~as the result of~~ operations which are part of a nuclear fuel cycle.

(Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

Section 1000.402 Definitions

As used in this Subpart:

"Curie" (Ci) means that quantity of radioactive material producing 37 billion nuclear transformations per second. (One millicurie (mCi)=0.001 Ci.)

"Dose equivalent" means the product of absorbed dose and appropriate factors to account for ~~differencies~~differences in biological effectiveness due to the quality of radiation and its spatial distribution in the body. The unit of dose equivalent is the "rem." (One millirem (mrem) = 0.001 rem.)

"General environment" means the total terrestrial, atmospheric and aquatic environments outside sites upon which any operation which is part of a nuclear

fuel cycle is conducted.

"Gigawatt-year" refers to the quantity of electrical energy produced at the busbar of a generating station. A gigawatt is equal to one billion watts. A gigawatt-year is equivalent to the amount of energy output represented by an average electric power level of one gigawatt sustained for one year.

"Member of the public" means any person ~~individual~~ that can receive a radiation dose in the general environment, whether the person may or may not also be exposed to radiation in an occupation associated with a nuclear fuel cycle. However, a person ~~an individual~~ is not considered a member of the public during any period in which that person ~~he~~ is engaged in carrying out any operation which is part of a nuclear fuel cycle.

"Nuclear fuel cycle" means the operations ~~defined to be~~ associated with the production of electrical power for public use by any fuel cycle through utilization of nuclear energy.

"Organ" means any human organ exclusive of the dermis, the epidermis, or the cornea.

"Site" means the area contained within the boundary of a location under the control of persons possessing or using radioactive material on which is conducted one or more operations covered by this Part ~~part~~.

"Uranium fuel cycle" means the operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel, to the extent that these directly support the production of electrical power for public use utilizing nuclear energy, but excludes mining operations, operations at waste disposal sites, transportation of any radioactive material in support of these operations, and the

reuse of recovered nonuranium special nuclear and by-product materials from the cycle.

(Source: Amended at 46 Ill. Reg.~~—~~ _____, effective _____)

Section 1000.403 Environmental Standards for Uranium Fuel Cycle

A person conducting operations ~~Operations~~ covered by this Subpart must ~~shall be conducted in such a manner as to provide reasonable assure~~assurance~~assurance~~assure that:

a) The annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as the result of exposures to planned discharges of radioactive materials, radon and its daughters excepted, to the general environment from uranium fuel cycle operations and to radiation from these operations.

b) The total quantity of radioactive materials entering the general environment from the entire uranium fuel cycle, per gigawatt-year of electrical energy produced by the fuel cycle, contains less than 50,000 curies of krypton-85, 5 millicuries of iodine-129, and 0.5 millicuries combined of plutonium-239 and other alpha-emitting transuranic radionuclides with the halflives greater than one year.

(Source: Amended at 46 Ill. Reg.~~—~~ _____, effective _____)

SUBPART E: RECORDS

Section 1000.501 Records

A person ~~All persons~~ subject to this Part ~~mustshall~~must submit to the Department, ~~with respect to~~ for any material or facility permitted or licensed by the NRC or for which an NRC permit or license is sought:

a) Preliminary Safety Analysis Report and Final Safety Analysis Report, as described in 10 CFR 50.34, incorporated by reference in Section 1000.202.

b) Application for Construction Permit and for all amendments ~~thereto~~, including information required by 10 CFR 50.34a, 50.36, and 51.20, incorporated by reference in Section 1000.202.

c) Environmental Impact Appraisal, Draft and Final Environmental Impact Statement, Negative Declaration, or other document prepared by the NRC under 10 CFR 51, incorporated by reference in Section 1000.202.

d) Operating Permit and all amendments thereto, including Technical Specifications under 10 CFR 50.36a, incorporated by reference in Section 1000.202.

e) Application for Amendment to Operating License.

f) All data, records, and reports submitted to the NRC ~~for~~in ~~connection with~~for determining or predicting radiation levels in air in unrestricted areas or the type or amount of radioactive materials emitted into air conducted by or for such persons.

(Source: Amended at 46 Ill. Reg.~~—~~ _____, effective ____)

Section 1000.502 Notification of Incidents

~~A~~All~~A~~ person subject to this Part ~~must~~shall~~must~~ immediately notify by telephone ~~and telegraph, or electronic mail, mailgram, or facsimile,~~ the Illinois Emergency Management Agency (IEMA) ~~Manager of the Office of Nuclear Facility Safety of the Illinois Department of Nuclear Safety, 1035 Outer Park Drive, Springfield, Illinois 62704,~~ of any incident or condition arising from the use or possession of licensed materials or facilities or the conducting of licensed activities which may have caused or threatens to cause emissions or radiation levels in excess of those allowed under this Part. IEMA's 24-hour Operations Center can be reached for notification of incidents at 1-800-782-7860, or, if calling from outside Illinois, 1-217-782-7860.

(Source: Amended at 46 Ill. Reg.~~—~~ _____, effective ____)

Section 1000.503 Other Provisions

a) The definitions specified ~~set out~~ in 35 Ill. Adm. Code 201.102 apply to this Part.

b) All persons subject to this Part are subject to the requirements and provisions of 35 Ill. Adm. Code 201.122, 201.123, ~~201.124,~~ 201.125, 201.126, 201.141, 201.150 and 201.151.

(Source: Amended at 46 Ill. Reg. _____, effective _____)

POLLUTION CONTROL BOARD

NOTICE OF PROPOSED AMENDMENTS

Section 1000.APPENDIX A Concentrations in Air Above Natural Background

Element (atomic number)	Isotope[1]		µCi/ml
Actinium (89)	AC 227	S	S8 x 10^{-14}
		I	I9 x 10^{-13}
	AC 228	S	AC 228S3 x 10^{-9}
		I	I6 x 10^{-10}
Americium (95)	Am 241 S	S	2 x 10^{-13}
		I	I4 x 10^{-12}
	Am 242m	S	Am 242mS2 x 10^{-13}
		I	I9 x 10^{-12}
	Am 242	S	Am 242S1 x 10^{-9}
		I	I2 x 10^{-9}
	Am 243	S	Am 243S2 x 10^{-13}
		I	I4 x 10^{-12}
	Am 244	S	Am 244S1 x 10^{-7}
		I	I8 x 10^{-7}
Antimony	Sb 122	S	S6 x 10^{-9}
		I	I5 x 10^{-9}
	Sb 124	S	Sb 124S5 x 10^{-9}
		I	I7 x 10^{-10}
	Sb 125	S	Sb 125S2 x 10^{-8}
		I	I9 x 10^{-10}
Argon (18)	A 37	Sub[2]	Sub[2]1 x 10^{-4}
	A 41	Sub	A 41Sub4 x 10^{-8}
Arsenic (33)	As 73	S	S7 x 10^{-8}
		I	I1 x 10^{-8}
	As 74	S	As 74S1 x 10^{-8}
		I	I4 x 10^{-9}
	As 76	S	As 76S4 x 10^{-9}
		I	I3 x 10^{-9}
	As 77	S	As 77S2 x 10^{-8}
		I	I1 x 10^{-8}
Astatine (85)	At 211	S	2 x10^{-10}
		I	1 x 10^{-9}
Barium (56)	Ba 131	S	4 x 10^{-8}

		I	1×10^{-8}
	Ba 140	S	4×10^{-9}
		I	1×10^{-9}
Berkelium (97)	Bk 249	S	3×10^{-11}
		I	4×10^{-9}
	Bk 250	S	5×10^{-9}
		I	4×10^{-8}
Berylium (4)	Be 7	S	2×10^{-7}
		I	4×10^{-8}
Bismuth (83)	Bi 206	S	6×10^{-9}
		I	5×10^{-9}
	Bi 207	S	6×10^{-9}
		I	5×10^{-10}
	Bi 210	S	2×10^{-10}
		I	2×10^{-10}
	Bi 212	S	3×10^{-9}
		I	7×10^{-9}
Bromine (35)	Br 82	S	4×10^{-8}
		I	6×10^{-9}
Cadmium (48)	Cd 109	S	2×10^{-9}
		I	3×10^{-9}
	Cd 115m	S	1×10^{-9}
		I	1×10^{-9}
	Cd 115	S	8×10^{-9}
		I	6×10^{-9}
Calcium (20)	Ca 45	S	1×10^{-9}
		I	4×10^{-9}
	Ca 47	S	6×10^{-9}
		I	6×10^{-9}
Californium (98)	Cf 249	S	5×10^{-14}
		I	3×10^{-12}
	Cf 250	S	2×10^{-13}
		I	3×10^{-12}
	Cf 251	S	6×10^{-14}
		I	3×10^{-12}
	Cf 252	S	2×10^{-13}
		I	1×10^{-12}
	Cf 253	S	3×10^{-11}

		I	3×10^{-11}
	Cf 254	S	2×10^{-13}
		I	2×10^{-13}
Carbon (6)	C 14	S	1×10^{-7}
	(CO~~(~~$_2$~~)~~)	Sub	1×10^{-6}
Cerium (58)	Ce 141	S	2×10^{-8}
		I	5×10^{-9}
	Ce 143	S	9×10^{-9}
		I	7×10^{-9}
	Ce 144	S	3×10^{-10}
		I	2×10^{-10}
Cesium (55)	Cs 131	S	4×10^{-7}
		I	1×10^{-7}
	Cs 134m	S	1×10^{-6}
		I	2×10^{-7}
	Cs 134	S	1×10^{-9}
		I	4×10^{-10}
	Cs 135	S	2×10^{-8}
		I	3×10^{-9}
	Cs 136	S	1×10^{-8}
		I	6×10^{-9}
	Cs 137	S	2×10^{-9}
		I	5×10^{-10}
Chlorine (17)	~~Cl 36~~C1 36	S	1×10^{-8}
		I	8×10^{-10}
	~~Cl 38~~C1 38	S	9×10^{-8}
		I	7×10^{-8}
Chromium (24)	Cr 51	S	4×10^{-7}
		I	8×10^{-8}
Cobalt (27)	Co 57	S	1×10^{-7}
		I	6×10^{-9}
	Co 58m	S	6×10^{-7}
		I	3×10^{-7}
	Co 58	S	3×10^{-8}
		I	2×10^{-9}
	Co 60	S	1×10^{-8}
		I	3×10^{-10}
Copper (29)	Cu 64	S	7×10^{-8}

		I	4×10^{-8}
Curium (96)	Cm 242	S	4×10^{-12}
		I	6×10^{-12}
	Cm 243	S	2×10^{-13}
		I	3×10^{-12}
	Cm 244	S	3×10^{-13}
		I	3×10^{-12}
	Cm 245	S	2×10^{-13}
		I	4×10^{-12}
	Cm 246	S	2×10^{-13}
		I	4×10^{-12}
	Cm 247	S	2×10^{-13}
		I	4×10^{-12}
	Cm 248	S	2×10^{-14}
		I	4×10^{-13}
	Cm 249	S	4×10^{-7}
		I	4×10^{-7}
Dysprosium (66)	Dy 165	S	9×10^{-8}
		I	7×10^{-8}
	Dy 166	S	8×10^{-9}
		I	7×10^{-9}
Einsteinium (99)	Es 253	S	3×10^{-11}
		I	2×10^{-11}
	Es 254m	S	2×10^{-10}
		I	2×10^{-10}
	Es 254	S	6×10^{-13}
		I	4×10^{-12}
	Es 255	S	2×10^{-11}
		I	1×10^{-11}
Erbium (68)	Er 169	S	2×10^{-8}
		I	1×10^{-8}
	Er 171	S	2×10^{-8}
		I	2×10^{-8}
Europium (63)	Eu 152	S	1×10^{-8}
	(T/~~2=9 2~~2=9.2 hrs)~~I~~	I~~1 x 10^{-8}~~	1×10^{-8}
	Eu 152	S	4×10^{-10}
	(T/2=13 yrs)~~I~~	I~~6 x 10^{-10}~~	6×10^{-10}

	Eu 154	S	1×10^{-10}
		I	2×10^{-10}
	Eu 155	S	3×10^{-9}
		I	3×10^{-9}
Fermium (100)	Fm 254	S	2×10^{-9}
		I	2×10^{-9}
	Fm 255	S	6×10^{-10}
		I	4×10^{-10}
	Fm 256	S	1×10^{-10}
		I	6×10^{-11}
Fluorine (9)	F 18	S	2×10^{-7}
		I	9×10^{-8}
Gadolinium (64)	Gd 153	S	8×10^{-9}
		I	3×10^{-9}
	Gd 159	S	2×10^{-8}
		I	1×10^{-8}
Gallium (31)	Ga 72	S	8×10^{-9}
		I	6×10^{-9}
Germanium (32)	Ge 71	S	4×10^{-7}
		I	2×10^{-7}
Gold (79)	Au 196	S	4×10^{-8}
		I	2×10^{-8}
	Au 198	S	1×10^{-8}
		I	8×10^{-9}
	Au 199	S	4×10^{-8}
		I	3×10^{-8}
Hafnium (72)	Hf 181	S	1×10^{-9}
		I	3×10^{-9}
Holmium (67)	Ho 166	S	7×10^{-9}
		I	6×10^{-9}
Hydrogen (1)	H3	S	2×10^{-7}
		I	2×10^{-7}
		Sub	$4 \times 10^{-}$~~(~~^{5}~~)~~
Indium (49)	In 113m	S	3×10^{-7}
		I	2×10^{-7}
	In 114m	S	4×10^{-9}
		I	7×10^{-10}
	In 115m	S	8×10^{-8}

		I	6×10^{-8}
	In 115	S	9×10^{-9}
		I	1×10^{-9}
Iodine (53)	I 125	S	8×10^{-11}
		I	6×10^{-9}
	I 126	S	9×10^{-11}
		I	1×10^{-8}
	I 129	S	2×10^{-11}
		I	2×10^{-9}
	I 131	S	1×10^{-10}
		I	1×10^{-8}
	I 132	S	3×10^{-9}
		I	3×10^{-8}
	I 133	S	4×10^{-10}
		I	7×10^{-9}
	I 134	S	6×10^{-9}
		I	1×10^{-7}
	I 135	S	1×10^{-9}
		I	1×10^{-8}
Iridium (77)	Ir 190	S	4×10^{-8}
		I	1×10^{-8}
	Ir 192	S	4×10^{-9}
		I	9×10^{-10}
	Ir 194	S	8×10^{-9}
		I	5×10^{-9}
Iron (26)	Fe 55	S	3×10^{-8}
		I	3×10^{-8}
	Fe 59	S	5×10^{-9}
		I	2×10^{-9}
Krypton (36)	Kr 85m	Sub	1×10^{-7}
	Kr 85	Sub	3×10^{-7}
	Kr 87	Sub	2×10^{-8}
	Kr 88	Sub	2×10^{-8}
Lanthanum (57)	La 140	S	5×10^{-9}
		I	4×10^{-9}
Lead (82)	Pb 203	S	9×10^{-8}
		I	6×10^{-8}
	Pb 210	S	4×10^{-12}

		I	8×10^{-12}
	Pb 212	S	6×10^{-10}
		I	7×10^{-10}
Lutetium (71)	Lu 177	S	2×10^{-8}
		I	2×10^{-8}
Manganese (25)	Mn 52	S	7×10^{-9}
		I	5×10^{-9}
	Mn 54	S	1×10^{-8}
		I	1×10^{-9}
	Mn 56	S	3×10^{-8}
		I	2×10^{-8}
Mercury (80)	Hg 197m	S	3×10^{-8}
		I	3×10^{-8}
	Hg 197	S	4×10^{-8}
		I	9×10^{-8}
	Hg 203	S	2×10^{-9}
		I	4×10^{-9}
Molybdenum (42)	Mo 99	S	3×10^{-8}
		I	7×10^{-9}
Neodymium (60)	Nd 144	S	3×10^{-12}
		I	1×10^{-11}
	Nd 147	S	1×10^{-8}
		I	8×10^{-9}
	Nd 149	S	6×10^{-8}
		I	5×10^{-8}
Neptunium (93)	Np 237	S	1×10^{-13}
		I	4×10^{-12}
	Np 239	S	3×10^{-8}
		I	2×10^{-8}
Nickel (28)	Ni 59	S	2×10^{-8}
		I	3×10^{-8}
	Ni 63	S	2×10^{-9}
		I	1×10^{-8}
	Ni 65	S	3×10^{-8}
		I	2×10^{-8}
Niobium (Columbium) (41)	Nb 93m	S	4×10^{-9}
		I	5×10^{-9}

	Nb 95	S	2×10^{-8}
		I	3×10^{-9}
	Nb 97	S	2×10^{-7}
		I	2×10^{-7}
Osmium (76)	Os 185	S	2×10^{-8}
		I	2×10^{-9}
	Os 191m	S	6×10^{-7}
		I	3×10^{-7}
	Os 191	S	4×10^{-8}
		I	1×10^{-8}
	Os 193	S	1×10^{-8}
		I	9×10^{-9}
Palladium (46)	Pd 103	S	5×10^{-8}
		I	3×10^{-8}
	Pd 109	S	2×10^{-8}
		I	1×10^{-8}
Phosphorus (15)	P 32	S	2×10^{-9}
		I	3×10^{-9}
Platinum (78)	Pt 191	S	3×10^{-8}
		I	2×10^{-8}
	Pt 193m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 193	S	4×10^{-8}
		I	1×10^{-8}
	Pt 197m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 197	S	3×10^{-8}
		I	2×10^{-8}
Plutonium (94)	Pu 238	S	7×10^{-14}
		I	1×10^{-12}
	Pu 239	S	6×10^{-14}
		I	1×10^{-12}
	Pu 240	S	6×10^{-14}
		I	1×10^{-12}
	Pu 241	S	3×10^{-12}
		I	1×10^{-9}
	Pu 242	S	6×10^{-14}
		I	1×10^{-12}

	Pu 243	S	6×10^{-8}
		I	8×10^{-8}
	Pu 244	S	6×10^{-14}
		I	1×10^{-12}
Polonium (84)	Po 210	S	2×10^{-11}
		I	7×10^{-12}
Potassium (19)	K 42	S	7×10^{-8}
		I	4×10^{-9}
Praseodymium (59)	Pr 142	S	7×10^{-9}
		I	5×10^{-9}
	Pr 143	S	1×10^{-8}
		I	6×10^{-9}
Promethium (61)	Pm 147	S	2×10^{-9}
		I	3×10^{-9}
	Pm 149	S	1×10^{-8}
		I	8×10^{-9}
Protoactinium (91)	Pa 230	S	6×10^{-11}
		I	3×10^{-11}
	Pa 231	S	4×10^{-14}
		I	4×10^{-12}
	Pa 233	S	2×10^{-8}
		I	6×10^{-9}
Radium (88)	Ra 223	S	6×10^{-11}
		I	8×10^{-12}
	Ra 224	S	2×10^{-10}
		I	2×10^{-11}
	Ra 226	S	3×10^{-12}
		I	2×10^{-12}
	Ra 228	S	2×10^{-12}
		I	1×10^{-12}
Radon (86)	Rn 220	S	1×10^{-8}
	Rn ~~222(3)~~222^{3}	3×10^{-9}	3×10^{-9}
Rhenium (75)	Re 183	S	9×10^{-8}
		I	5×10^{-9}
	Re 186	S	2×10^{-8}
		I	8×10^{-9}
	Re 187	S	3×10^{-7}
		I	2×10^{-8}

	Re 188	S	1×10^{-8}
		I	6×10^{-9}
Rhodium (45)	Rh 103m	S	3×10^{-6}
		I	2×10^{-6}
	Rh 105	S	3×10^{-8}
		I	2×10^{-8}
Rubidium (37)	Rb 86	S	1×10^{-8}
		I	2×10^{-9}
	Rb 87	S	2×10^{-8}
		I	2×10^{-9}
Ruthenium (44)	Ru 97	S	8×10^{-8}
		I	6×10^{-8}
	Ru 103	S	2×10^{-8}
		I	3×10^{-9}
	Ru 105	S	2×10^{-8}
		I	2×10^{-8}
	Ru 106	S	3×10^{-9}
		I	2×10^{-10}
Samarium (62)	Sm 147	S	2×10^{-12}
		I	9×10^{-12}
	Sm 151	S	2×10^{-9}
		I	5×10^{-9}
	Sm 153	S	2×10^{-8}
		I	1×10^{-8}
Scandium (21)	Sc 46	S	8×10^{-9}
		I	8×10^{-10}
	Sc 47	S	2×10^{-8}
		I	2×10^{-8}
	Sc 48	S	6×10^{-9}
		I	5×10^{-9}
Selenium (34)	Se 75	S	4×10^{-8}
		I	4×10^{-9}
Silicon (14)	Si 31	S	2×10^{-7}
		I	3×10^{-8}
Silver (47)	Ag 105	S	2×10^{-8}
		I	3×10^{-9}
	Ag 110m	S	7×10^{-9}
		I	3×10^{-10}

	Ag 111	S	1×10^{-8}
		I	8×10^{-9}
Sodium (11)	Na 22	S	6×10^{-9}
		I	3×10^{-10}
	Na 24	S	4×10^{-8}
		I	5×10^{-9}
Strontium (38)	Sr 85m	S	1×10^{-6}
		I	1×10^{-6}
	Sr 85	S	8×10^{-9}
		I	4×10^{-9}
	Sr 89	S	3×10^{-10}
		I	1×10^{-9}
	Sr 90	S	3×10^{-11}
		I	2×10^{-10}
	Sr 91	S	2×10^{-8}
		I	9×10^{-9}
	Sr 92	S	2×10^{-8}
		I	1×10^{-8}
Sulfur (16)	S 35	S	9×10^{-9}
		I	9×10^{-9}
Tantalum (73)	Ta 182	S	1×10^{-9}
		I	7×10^{-10}
Technetium (43)	Tc 96m	S	3×10^{-6}
		I	1×10^{-6}
	Tc 96	S	2×10^{-8}
		I	8×10^{-9}
	Tc 97m	S	8×10^{-8}
		I	5×10^{-9}
	Tc 97	S	4×10^{-7}
		I	1×10^{-8}
	Tc 99m	S	1×10^{-6}
		I	5×10^{-7}
	Tc 99	S	7×10^{-8}
		I	2×10^{-9}
Tellurium (52)	Te 125m	S	1×10^{-8}
		I	4×10^{-9}
	Te 127m	S	5×10^{-9}
		I	1×10^{-9}

	Te 127	S	6×10^{-8}
		I	3×10^{-8}
	Te 129m	S	3×10^{-9}
		I	1×10^{-9}
	Te 129	S	2×10^{-7}
		I	1×10^{-7}
	Te 131m	S	1×10^{-8}
		I	6×10^{-9}
	Te 132	S	7×10^{-9}
		I	4×10^{-9}
Terbium (65)	Tb 160	S	3×10^{-9}
		I	1×10^{-9}
Thallium (81)	Tl 200	S	9×10^{-8}
		I	4×10^{-8}
	Tl 201	S	7×10^{-8}
		I	3×10^{-8}
	Tl 202	S	3×10^{-8}
		I	8×10^{-9}
	Tl 204	S	2×10^{-8}
		I	9×10^{-10}
Thorium (90)	Th 227	S	1×10^{-11}
		I	6×10^{-12}
	Th 228	S	3×10^{-13}
		I	2×10^{-13}
	Th 230	S	8×10^{-14}
		I	3×10^{-13}
	Th 231	S	5×10^{-8}
		I	4×10^{-8}
	Th 232	S	1×10^{-12}
		I	1×10^{-12}
	Th natural	S	2×10^{-12}
		I	2×10^{-12}
	Th 234	S	2×10^{-9}
		I	1×10^{-9}
Thulium (69)	Tm 170	S	1×10^{-9}
		I	1×10^{-9}
	Tm 171	S	4×10^{-9}
		I	8×10^{-9}

Tin (50)	Sn 113	S	1×10^{-8}
		I	2×10^{-9}
	Sn 125	S	4×10^{-9}
		I	3×10^{-9}
Tungsten (Wolfram) (74)	W 181	S	8×10^{-8}
		I	4×10^{-9}
	W 185	S	3×10^{-8}
		I	4×10^{-9}
	W 187	S	2×10^{-8}
		I	1×10^{-8}
Uranium (92)	U 230	S	1×10^{-11}
		I	4×10^{-12}
	U 232	S	3×10^{-12}
		I	9×10^{-13}
	U 233	S	2×10^{-11}
		I	4×10^{-12}
	U 234	S~~(4)~~	2×10^{-11}
		I	4×10^{-12}
	U 235	S~~(4)~~	2×10^{-11}
		I	4×10^{-12}
	U 236	S	2×10^{-11}
		I	4×10^{-12}
	U 238	S~~(4)~~	3×10^{-12}
		I	5×10^{-12}
	U 240	S	8×10^{-9}
		I	6×10^{-9}
	U-natural ~~S(4)~~	S[4]	5×10^{-12}
		I	5×10^{-12}
Vanadium (23)	V 48	S	6×10^{-9}
		I	2×10^{-9}
Xenon (54)	Xe 131m	Sub	4×10^{-7}
	Xe 133	Sub	3×10^{-7}
	Xe 133m	Sub	3×10^{-7}
	Xe 135	Sub	1×10^{-7}
Ytterbium (70)	Yb 175	S	2×10^{-8}
		I	2×10^{-8}
Yttrium (39)	Y 90	S	4×10^{-9}
		I	3×10^{-9}

	Y 91m	S	8×10^{-7}
		I	6×10^{-7}
	Y 91	S	1×10^{-9}
		I	1×10^{-9}
	Y 92	S	1×10^{-8}
		I	1×10^{-8}
	Y 93	S	6×10^{-9}
		I	5×10^{-9}
Zinc (30)	Zn 65	S	4×10^{-9}
		I	2×10^{-9}
	Zn 69m	S	1×10^{-8}
		I	1×10^{-8}
	Zn 69	S	2×10^{-7}
		I	3×10^{-7}
Zirconium (40)	Zr 93	S	4×10^{-9}
		I	1×10^{-8}
	Zr 95	S	4×10^{-9}
		I	1×10^{-9}
	Zr 97	S	4×10^{-9}
		I	3×10^{-9}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio- active half-life less than 2 hours.	Sub		3×10^{-6}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio- active half-life greater than 2 hours.			1×10^{-10}

Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.		2×10^{-14}

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

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

[3]These radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. The 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.~~)~~

[4]For soluble mixtures of U-238, U-234 and U-235 in air chemical toxicity may be the limiting factor. 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 U. The specific activity (SA) for other mixtures of U-238, U-235 and U-234, if not known, will ~~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 ~~>than~~≥ 0.72

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

NOTE: Where ~~In any case where there is~~ a mixture in air of more than one radionuclide exists, the limiting values ~~for purposes~~ of this Appendix 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 Appendix A for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity").

EXAMPLE: If radionuclides A, B, and C are present in concentrations C_A, C_B, C_C, and

if the applicable MPC's are MPC_A, and MPC_B, and MPC_C respectively, then the concentrations ~~mustshall~~must be limited so that the following relationship exists:

$$(C_A/MPC_A) + (C_B/MPC_B) + (C_C/MPC_C) \text{ ~~< than~~} \leq 1$$

2. If either the identity or the concentration of any radionuclide in the mixture is not ~~known,~~ the limiting values ~~for purposes~~ of Appendix A ~~mustshall~~must be 2×10^{-14}.

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 Appendix A for the radionuclide in the mixture having the lowest concentration limit; or

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

c. Element (atomic number) and isotope. µCi/ml

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.	1×10^{-10}
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present.	1×10^{-11}
If it is known that alpha-emitters and Ac 227 are not present.	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.	1×10^{-13}

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

5004. If a mixture of radionuclides consists of uranium and its daughters in ore dust before
501 ~~prior to~~ chemical separation of the uranium from the ore, the following values may be
502 used for uranium and its daughters through radium-226, instead of those from paragraphs
503 1, 2, or 3 above:
504
505 3 x 10^{-12} -12 µCi/ml gross alpha activity; 2 x 10-12 ~~uCi~~µCi/ml natural uranium; or 3
506 micrograms per cubic meter of air natural uranium.
507
5085. For ~~purposes of~~ this note, a radionuclide may be considered as not present in a mixture
509 if:
510
511 ~~(~~a~~)~~ . the ratio of the concentration of that radionuclide in the mixture (~~C(A)~~CA) to the
512 concentration limit for that radionuclide specified in Appendix A (~~MPC_A~~MPCA)
513 does not exceed 1/10 (i.e., ~~C_A~~CA/~~MPC_A~~ ~~<~~MPCA ≤ than 1/10), and
514
515 ~~(~~b~~)~~ . the sum of such ratios for all the radionuclides considered as not present in the
516 mixtures does not exceed 1/4, (i.e., (CA/MPCA + ~~C_B~~CB/~~MPC_B~~.... MPCB + < than
517 1/4).
518
519
521 (Source: Amended at 46 Ill. Reg. ~~—~~ _____, effective _____)

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Padding cell	

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