

## POLLUTION CONTROL BOARD

## NOTICE OF PROPOSED AMENDMENTS

- 1) Heading of the Part: Radiation Hazards
- 2) Code Citation: 35 Ill. Adm. Code 1000
- 3) 

<u>Section Numbers:</u>	<u>Proposed Actions:</u>
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 IEPA's proposal arose from Executive Order 2016-13, which required agencies to identify outdated, repetitive, confusing, or unnecessary rules and then amend or repeal them.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](http://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](http://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:

1 TITLE 35: ENVIRONMENTAL PROTECTION  
2 SUBTITLE I: ATOMIC RADIATION  
3 CHAPTER I: POLLUTION CONTROL BOARD  
4

5 PART 1000  
6 RADIATION HAZARDS  
7

8 SUBPART A: GENERAL PROVISIONS  
9

10	Section	
11	1000.101	Authority
12	1000.102	Purpose
13	1000.103	Scope
14		

15 SUBPART B: DEFINITIONS  
16

17	Section	
18	1000.201	Definitions
19	1000.202	Incorporations by Reference
20		

21 SUBPART C: STANDARDS AND LIMITATIONS  
22

23	Section	
24	1000.301	Permissible Levels of Radiation in Unrestricted Areas
25	1000.302	Radioactive Emissions to Unrestricted Areas
26		

27 SUBPART D: ADDITIONAL REQUIREMENTS  
28

29	Section	
30	1000.401	Applicability
31	1000.402	Definitions
32	1000.403	Environmental Standards for Uranium Fuel Cycle
33		

34 SUBPART E: RECORDS  
35

36	Section	
37	1000.501	Records
38	1000.502	Notification of Incidents
39	1000.503	Other Provisions
40		

41 1000.APPENDIX A Concentrations in Air Above Natural Background  
42

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

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

45  
46 SOURCE: Adopted in R82-2 at 9 Ill. Reg. 19391, effective December 4, 1985; amended in R82-  
47 2(B) at 10 Ill. Reg. 12938, effective July 21, 1986; amended in R18-28 at 46 Ill. Reg. \_\_\_\_\_,  
48 effective \_\_\_\_\_.

49

50

### SUBPART A: GENERAL PROVISIONS

51

#### **Section 1000.101 Authority**

52

53  
54 The Board adopts the rules contained in this title under the authority of Title VI-A of the  
55 Environmental Protection Act. [415 ILCS 5/25b]

56

57 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

58

#### **Section 1000.102 Purpose**

59

60

61 a) This Part establishes standards for protection against radiological air pollutants  
62 associated with materials and activities under licenses issued by the United States  
63 Nuclear Regulatory Commission (NRC) under the Atomic Energy Act of 1954  
64 (42 U.S.C. 5801 *et seq.*), and the Energy Reorganization Act of 1974 (42 U.S.C.  
65 5801 *et seq.*)

66

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

74

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

79

80 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

81

#### **Section 1000.103 Scope**

82

83  
84 This Part applies to all persons who receive, possess, use, or transfer material licensed under 10  
85 CFR 30 through 35, 40, or 70 (1984), incorporated by reference in Section 1000.202 or who are  
86 licensed to operate a production or utilization facility under 10 CFR 50 (1984), incorporated by  
87 reference in Section 1000.202.

88

(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,

**1<sup>st</sup> Notice**

JCAR351000-2206867r01

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

135  
136 "Radioactive material" and "radioactive emissions" means any dusts, particulates,  
137 fumes, mists, vapors, or gases which spontaneously emit ionizing radiation.

138  
139 "Rem" means a measure of the dose of any ionizing radiation to body tissue in  
140 terms of its estimated biological effect relative to a dose received from an  
141 exposure to one roentgen of X-rays. (One millirem (mrem) = 0.001 rem). The  
142 relation of rem to other dose units depends upon the biological effect under  
143 consideration and upon the condition of irradiation. For this Part, any of the  
144 following is considered to be equivalent to a dose of one rem:

145  
146 An exposure to one roentgen of X- or gamma radiation;

147  
148 A dose of one rad due to X-, gamma, or beta radiation;

149  
150 A dose of 0.1 rad due to neutrons or high energy protons;

151  
152 A dose of 0.05 rad due to particles heavier than protons and with sufficient  
153 energy to reach the lens of the eye. If it is more convenient to measure the  
154 neutron flux, or equivalent, than to determine the neutron dose in rads, one  
155 rem of neutron radiation may be assumed to be equivalent to 14 million  
156 neutrons per square centimeter incident upon the body; or, if information  
157 is available to estimate with reasonable accuracy the approximate  
158 distribution in energy of neutrons, the incident number of neutrons per  
159 square centimeter equivalent to one rem may be estimated from the  
160 following table.  
161

Neutron Flux Dose Equivalents

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

7.5 .....	24 x 10 <sup>6</sup> .....	17
10.0 .....	24 x 10 <sup>6</sup> .....	17
10 to 30 .....	14 x 10 <sup>6</sup> .....	10

162  
 163  
 164  
 165  
 166  
 167  
 168  
 169  
 170  
 171  
 172  
 173  
 174  
 175  
 176  
 177  
 178  
 179  
 180  
 181  
 182  
 183  
 184  
 185  
 186  
 187  
 188  
 189  
 190  
 191  
 192  
 193  
 194  
 195  
 196  
 197  
 198  
 199  
 200  
 201  
 202

"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).

- 203 i) Domestic Licensing of Production and Utilization Facilities, 10 CFR 50 (1984).
- 204
- 205 j) Environmental Protection Regulations for Domestic Licensing and Related
- 206 Regulatory Functions, 10 CFR 51 (1984).
- 207
- 208 k) Domestic Licensing of Special Nuclear Material, 10 CFR 70 (1984).
- 209
- 210 (Source: Added at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)
- 211

SUBPART C: STANDARDS AND LIMITATIONS

**Section 1000.301 Permissible Levels of Radiation in Unrestricted Areas**

215  
216 A person must not possess, use, receive, or transfer licensed material or engage in licensed  
217 activities as to create radiation levels in air in any unrestricted area:

- 218
- 219 a) That could result in an individual, when all radioactive emissions by the licensee
- 220 are taken into account, receiving a dose to the whole body in excess of 0.5 rem in
- 221 any one year;
- 222
- 223 b) That could result in an individual continuously present in the area, when all
- 224 radioactive emissions by the licensee are taken into account, receiving a dose in
- 225 excess of 2 millirems in any one hour; or
- 226
- 227 c) That could result in an individual continuously present in the area, when all
- 228 radioactive emissions by licensee are taken into account, receiving a dose in
- 229 excess of 100 millirems in any seven consecutive days.
- 230

231 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

**Section 1000.302 Radioactive Emissions to Unrestricted Areas**

- 232
- 233
- 234
- 235 a) A person must not possess, use, receive, or transfer licensed material or engage in
- 236 licensed activities so as to release to air in an unrestricted area radioactive
- 237 material exceeding the concentration specified in Appendix A of. For this
- 238 Section, concentrations of radioactive material may be averaged over a period not
- 239 greater than one year.
- 240
- 241 b) For this Section, the concentration limits in Appendix A apply at the boundary of
- 242 the restricted area. The concentration of radioactive material discharged through
- 243 a stack, pipe or similar conduit may be determined for the point where the
- 244 material leaves the conduit. If the conduit discharges within the restricted area,
- 245 the concentration at the boundary may be determined by applying established
- 246 factors for dilution, dispersion, or decay between the point of discharge and the



247 boundary.

248

249 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

250

251 **SUBPART D: ADDITIONAL REQUIREMENTS**

252

253 **Section 1000.401 Applicability**

254

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

258

259 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

260

261 **Section 1000.402 Definitions**

262

263 As used in this Subpart:

264

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

267

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

272

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

276

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

281

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

287

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

291  
292 "Organ" means any human organ exclusive of the dermis, the epidermis, or the  
293 cornea.  
294  
295 "Site" means the area contained within the boundary of a location under the  
296 control of persons possessing or using radioactive material on which is conducted  
297 one or more operations covered by this Part.  
298  
299 "Uranium fuel cycle" means the operations of milling of uranium ore, chemical  
300 conversion of uranium, isotopic enrichment of uranium, fabrication of uranium  
301 fuel, generation of electricity by a light-water-cooled nuclear power plant using  
302 uranium fuel, and reprocessing of spent uranium fuel, to the extent that these  
303 directly support the production of electrical power for public use utilizing nuclear  
304 energy, but excludes mining operations, operations at waste disposal sites,  
305 transportation of any radioactive material in support of these operations, and the  
306 reuse of recovered nonuranium special nuclear and by-product materials from the  
307 cycle.

308  
309 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)  
310

311 **Section 1000.403 Environmental Standards for Uranium Fuel Cycle**  
312

313 A person conducting operations covered by this Subpart must assure that:  
314

- 315 a) The annual dose equivalent does not exceed 25 millirems to the whole body, 75  
316 millirems to the thyroid, and 25 millirems to any other organ of any member of  
317 the public as the result of exposures to planned discharges of radioactive  
318 materials, radon and its daughters excepted, to the general environment from  
319 uranium fuel cycle operations and to radiation from these operations.  
320
- 321 b) The total quantity of radioactive materials entering the general environment from  
322 the entire uranium fuel cycle, per gigawatt-year of electrical energy produced by  
323 the fuel cycle, contains less than 50,000 curies of krypton-85, 5 millicuries of  
324 iodine-129, and 0.5 millicuries combined of plutonium-239 and other alpha-  
325 emitting transuranic radionuclides with the halflives greater than one year.  
326

327 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)  
328

329 **SUBPART E: RECORDS**  
330

331 **Section 1000.501 Records**  
332

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

- 335
- 336 a) Preliminary Safety Analysis Report and Final Safety Analysis Report, as
- 337 described in 10 CFR 50.34, incorporated by reference in Section 1000.202.
- 338
- 339 b) Application for Construction Permit and for all amendments, including
- 340 information required by 10 CFR 50.34a, 50.36, and 51.20, incorporated by
- 341 reference in Section 1000.202.
- 342
- 343 c) Environmental Impact Appraisal, Draft and Final Environmental Impact
- 344 Statement, Negative Declaration, or other document prepared by the NRC under
- 345 10 CFR 51, incorporated by reference in Section 1000.202.
- 346
- 347 d) Operating Permit and all amendments thereto, including Technical Specifications
- 348 under 10 CFR 50.36a, incorporated by reference in Section 1000.202.
- 349
- 350 e) Application for Amendment to Operating License.
- 351
- 352 f) All data, records, and reports submitted to the NRC for determining or predicting
- 353 radiation levels in air in unrestricted areas or the type or amount of radioactive
- 354 materials emitted into air conducted by or for such persons.
- 355

356 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

357

358 **Section 1000.502 Notification of Incidents**

359

360 A person subject to this Part must immediately notify by telephone the Illinois Emergency

361 Management Agency (IEMA) of any incident or condition arising from the use or possession of

362 licensed materials or facilities or the conducting of licensed activities which may have caused or

363 threatens to cause emissions or radiation levels in excess of those allowed under this Part.

364 IEMA's 24-hour Operations Center can be reached for notification of incidents at 1-800-782-

365 7860, or, if calling from outside Illinois, 1-217-782-7860.

366

367 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

368

369 **Section 1000.503 Other Provisions**

- 370
- 371 a) The definitions specified in 35 Ill. Adm. Code 201.102 apply to this Part.
- 372
- 373 b) All persons subject to this Part are subject to the requirements and provisions of
- 374 35 Ill. Adm. Code 201.122, 201.123, 201.125, 201.126, 201.141, 201.150 and
- 375 201.151.
- 376

377 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

378

379  
380

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

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

## 1st Notice

JCAR351000-2206867r01

Beryllium (4)	Be 7	I	$4 \times 10^{-8}$
		S	$2 \times 10^{-7}$
Bismuth (83)	Bi 206	I	$4 \times 10^{-8}$
		S	$6 \times 10^{-9}$
		I	$5 \times 10^{-9}$
		S	$6 \times 10^{-9}$
		I	$5 \times 10^{-10}$
Bromine (35)	Br 82	S	$2 \times 10^{-10}$
		I	$2 \times 10^{-10}$
		S	$3 \times 10^{-9}$
		I	$7 \times 10^{-9}$
Cadmium (48)	Cd 109	S	$4 \times 10^{-8}$
		I	$6 \times 10^{-9}$
		S	$2 \times 10^{-9}$
Calcium (20)	Ca 45	I	$3 \times 10^{-9}$
		S	$1 \times 10^{-9}$
		I	$1 \times 10^{-9}$
Californium (98)	Cf 249	S	$8 \times 10^{-9}$
		I	$6 \times 10^{-9}$
		S	$1 \times 10^{-9}$
		I	$4 \times 10^{-9}$
		S	$6 \times 10^{-9}$
		I	$6 \times 10^{-9}$
		S	$5 \times 10^{-14}$
		I	$3 \times 10^{-12}$
		S	$2 \times 10^{-13}$
		I	$3 \times 10^{-12}$
Carbon (6)	C 14 (CO <sub>2</sub> )	S	$6 \times 10^{-14}$
		I	$3 \times 10^{-12}$
		S	$2 \times 10^{-13}$
		I	$3 \times 10^{-12}$
		S	$2 \times 10^{-13}$
		I	$1 \times 10^{-12}$
		S	$3 \times 10^{-11}$
		I	$3 \times 10^{-11}$
		S	$2 \times 10^{-13}$
		I	$2 \times 10^{-13}$
Cerium (58)	Ce 141	S	$1 \times 10^{-7}$
		I	$1 \times 10^{-6}$
		Sub	$1 \times 10^{-6}$
Cesium (55)	Cs 131	S	$2 \times 10^{-8}$
		I	$5 \times 10^{-9}$
		S	$9 \times 10^{-9}$
Cesium (55)	Cs 131	I	$7 \times 10^{-9}$
		S	$3 \times 10^{-10}$
		I	$2 \times 10^{-10}$

# 1st Notice

JCAR351000-2206867r01

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

## 1st Notice

JCAR351000-2206867r01

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

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

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



## 1st Notice

JCAR351000-2206867r01

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

# 1<sup>st</sup> Notice

JCAR351000-2206867r01

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

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

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

# 1<sup>st</sup> Notice

JCAR351000-2206867r01

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

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

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

# 1<sup>st</sup> Notice

JCAR351000-2206867r01

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

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

Xenon (54)	Xe 131m	I	$2 \times 10^{-9}$
		Sub	$4 \times 10^{-7}$
	Xe 133	Sub	$3 \times 10^{-7}$
	Xe 133m	Sub	$3 \times 10^{-7}$
Ytterbium (70)	Xe 135	Sub	$1 \times 10^{-7}$
	Yb 175	S	$2 \times 10^{-8}$
		I	$2 \times 10^{-8}$
Yttrium (39)	Y 90	S	$4 \times 10^{-9}$
		I	$3 \times 10^{-9}$
	Y 91m	S	$8 \times 10^{-7}$
		I	$6 \times 10^{-7}$
	Y 91	S	$1 \times 10^{-9}$
		I	$1 \times 10^{-9}$
	Y 92	S	$1 \times 10^{-8}$
		I	$1 \times 10^{-8}$
Zinc (30)	Y 93	S	$6 \times 10^{-9}$
		I	$5 \times 10^{-9}$
	Zn 65	S	$4 \times 10^{-9}$
		I	$2 \times 10^{-9}$
	Zn 69m	S	$1 \times 10^{-8}$
Zirconium (40)		I	$1 \times 10^{-8}$
	Zn 69	S	$2 \times 10^{-7}$
		I	$3 \times 10^{-7}$
	Zr 93	S	$4 \times 10^{-9}$
		I	$1 \times 10^{-8}$
	Zr 95	S	$4 \times 10^{-9}$
		I	$1 \times 10^{-9}$
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.	Zr 97	S	$4 \times 10^{-9}$
		I	$3 \times 10^{-9}$
		Sub	$3 \times 10^{-6}$

$1 \times 10^{-10}$

Any single radionuclide  
not listed above with  
decay mode other than  
alpha emission or  
spontaneous fission and  
with radio- active half-

**1<sup>st</sup> Notice**

life greater than 2 hours.

Any single radionuclide  
not listed above, which  
decays by alpha emission  
or spontaneous fission. 2 x 10<sup>-14</sup>

381  
382 <sup>1</sup>Soluble (S); Insoluble (I).

383  
384 <sup>2</sup>"Sub" means that values given are for submersion in a semispherical infinite cloud of airborne  
385 material.

386  
387 <sup>3</sup>These radon concentrations are appropriate for protection from radon-222 combined with its  
388 short-lived daughters. The value may be replaced by one-thirtieth (1/30) of a "working level."  
389 (A "working level" is defined as any combination of short-lived radon-222 daughters,  
390 polonium-218, lead-214, bismuth-214 and polonium-214, in one liter of air, without regard to  
391 the degree of equilibrium, that will result in the ultimate emission of 1.3 x 10<sup>5</sup> MeV of alpha  
392 particle energy.

393  
394 <sup>4</sup>For soluble mixtures of U-238, U-234 and U-235 in air chemical toxicity may be the limiting  
395 factor. The concentration value is 0.007 milligrams uranium per cubic meter of air. The  
396 specific activity for natural uranium is 6.77 x 10<sup>-7</sup> curies per gram U. The specific activity (SA)  
397 for other mixtures of U-238, U-235 and U-234, if not known, will be:

398  $SA=3.6 \times 10^{-7}$  curies/gram U ..... U-depleted

400  
401  $SA=(0.4 + 0.38 E + 0.0034 E^2) 10^{-6}$  .....  $E \geq 0.72$

402  
403 where E is the percentage by weight of U-235, expressed as percent.

404  
405 NOTE: Where a mixture in air of more than one radionuclide exists, the limiting values of this  
406 Appendix should be determined as follows:

- 407  
408 1. If the identity and concentration of each radionuclide in the mixture are known, the  
409 limiting values should be derived as follows: Determine, for each radionuclide in the  
410 mixture, the ratio between the quantity present in the mixture and the limit otherwise  
411 established in Appendix A for the specific radionuclide when not in a mixture. The sum  
412 of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity").

413  
414 EXAMPLE: If radionuclides A, B, and C are present in concentrations C<sub>A</sub>, C<sub>B</sub>, C<sub>C</sub>, and if  
415 the applicable MPC's are MPC<sub>A</sub>, and MPC<sub>B</sub>, and MPC<sub>C</sub> respectively, then the



## 1<sup>st</sup> Notice

JCAR351000-2206867r01

416 concentrations must be limited so that the following relationship exists:

417

$$418 \quad (C_A/MPC_A) + (C_B/MPC_B) + (C_C/MPC_C) \leq 1$$

419

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

422

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

425

426 a. If the identity of each radionuclide in the mixture is known but the concentration  
427 of one or more of the radionuclides in the mixture is not known, the concentration  
428 limit for the mixture is the limit specified in Appendix A for the radionuclide in  
429 the mixture having the lowest concentration limit; or

430

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

436

437 c. Element (atomic number) and isotope.  $\mu\text{Ci/ml}$

438

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.  $1 \times 10^{-10}$

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

If it is known that alpha-emitters and Ac 227 are not present.  $1 \times 10^{-12}$

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.  $1 \times 10^{-13}$

439

440 4. If a mixture of radionuclides consists of uranium and its daughters in ore dust before  
441 chemical separation of the uranium from the ore, the following values may be used for  
442 uranium and its daughters through radium-226, instead of those from paragraphs 1, 2, or  
443 3 above:

444

445  $3 \times 10^{-12}$   $\mu\text{Ci/ml}$  gross alpha activity;  $2 \times 10^{-12}$   $\mu\text{Ci/ml}$  natural uranium; or 3  
446 micrograms per cubic meter of air natural uranium.

447

448 5. For this note, a radionuclide may be considered as not present in a mixture if:

## 1<sup>st</sup> Notice

JCAR351000-2206867r01

449  
450  
451  
452  
453  
454  
455  
456  
457  
458

- 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.,  $CA/MPCA \leq$  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~~

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

3  
4 PART 1000  
5 RADIATION HAZARDS

6  
7 SUBPART A: GENERAL PROVISIONS

8  
9Section

101000.101 Authority

111000.102 Purpose ~~and Policy~~

121000.103 Scope

13  
14 SUBPART B: DEFINITIONS

15  
16Section

171000.201 Definitions

181000.202 Incorporations by Reference

19  
20 SUBPART C: STANDARDS AND LIMITATIONS

21  
22Section

231000.301 Permissible ~~Permissable~~ Levels of Radiation in Unrestricted Areas

241000.302 Radioactive Emissions to Unrestricted Areas

25  
26 SUBPART D: ADDITIONAL REQUIREMENTS

27  
28Section

291000.401 Applicability

301000.402 Definitions

311000.403 Environmental Standards for Uranium Fuel Cycle

32  
33 SUBPART E: RECORDS

34  
35Section

361000.501 Records

371000.502 Notification of Incidents

~~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

51Section 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

59Section 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 ~~considering~~ taking  
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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

76 public interest.

77

78 c) Persons licensed by the NRC ~~United States Nuclear Regulatory Commission~~ to  
79 operate light-water-cooled nuclear power reactors ~~will~~shall be deemed to will  
80 satisfy ~~the requirements of this~~ subsection (b) if they achieve the design objectives  
81 and limiting conditions for operation specified ~~set out~~ in 10 CFR 50, Appendix I  
82 (1984), incorporated by reference in Section 1000.202. ~~This Part incorporates no~~  
83 ~~further amendments or editions to those objectives and conditions for operation.~~

84

85 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

86

87 **Section 1000.103 Scope**

88

89 ~~This~~The requirements of this ~~This~~ Part applies ~~apply~~ to all persons who receive, possess, use, or  
90 transfer material licensed ~~under pursuant to Parts~~under 10 CFR 30 through 35, 40, or 70 (1984),  
91 incorporated by reference in Section 1000.202 or who are licensed to operate a production or  
92 utilization facility ~~under pursuant to~~under 10 CFR 50 (1984), incorporated by reference in Section  
93 1000.202. ~~of the regulations of the United States Nuclear Regulatory Commission.~~

94

95 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

96

97

SUBPART B: DEFINITIONS

98

99 **Section 1000.201 Definitions**

100

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

104

105 "Act" means the Environmental Protection Act, [415 ILCS 5/1 ~~Ill. Rev. Stat.,~~  
106 ~~1983, ch. 111-1/2, pars 1001 et seq.~~]

107

108 "Board" means the Illinois Pollution Control Board.

109

110

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

113.

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151

"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**

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

154  
155  
156 "Radioactive material" and "radioactive emissions" means any dusts, particulates,  
157 fumes, mists, vapors, or gases which spontaneously emit ionizing radiation.

158  
159  
160 "Rem" means a measure of the dose of any ionizing radiation to body tissue in  
161 terms of its estimated biological effect relative to a dose received from an  
162 exposure to one roentgen of X-rays. (One millirem (mrem) = 0.001 rem). The  
163 relation of rem to other dose units depends upon the biological effect under  
164 consideration and upon the condition of irradiation. For ~~the purpose of~~ this Part,  
165 any of the following is considered to be equivalent to a dose of one rem:

166  
167 An exposure to one roentgen of X- or gamma radiation;

168  
169 A dose of one rad due to X-, gamma, or beta radiation;

170  
171 A dose of 0.1 rad due to neutrons or high energy protons;

172  
173 A dose of 0.05 rad due to particles heavier than protons and with sufficient  
174 energy to reach the lens of the eye. If it is more convenient to measure the  
175 neutron flux, or equivalent, than to determine the neutron dose in rads, one  
176 rem of neutron radiation may ~~for purposes of this Part~~ be assumed to be  
177 equivalent to 14 million neutrons per square centimeter incident upon the  
178 body; or, if ~~there exists sufficient~~ information is available to estimate with  
179 reasonable accuracy the approximate distribution in energy of neutrons,  
180 the incident number of neutrons per square centimeter equivalent to one  
181 rem may be estimated from the following table.

182  
183 **Neutron Flux Dose Equivalents**

185 Neutron energy (Mev)	186 No. of Neutron per 187 square centimeter 188 equivalent to a dose of 1 rem (neutrons/cm <sup>2</sup> )	189 Average flux to deliver 100 millirem in 40 hours (neutrons/cm <sup>2</sup> ) per second
--------------------------	---	---

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

190			
191	<del>Thermal</del>	<del>970 x 10<sup>6</sup></del>	<del>670</del>
192	<del>0.0001</del>	<del>720 x 10<sup>6</sup></del>	<del>500</del>
193	<del>0.005</del>	<del>820 x 10<sup>6</sup></del>	<del>570</del>
194	<del>0.02</del>	<del>400 x 10<sup>6</sup></del>	<del>280</del>
195	<del>0.1</del>	<del>120 x 10<sup>6</sup></del>	<del>80</del>
196	<del>0.5</del>	<del>43 x 10<sup>6</sup></del>	<del>30</del>
197	<del>1.0</del>	<del>26 x 10<sup>6</sup></del>	<del>18</del>
198	<del>2.5</del>	<del>29 x 10<sup>6</sup></del>	<del>20</del>
199	<del>5.0</del>	<del>26 x 10<sup>6</sup></del>	<del>18</del>
200	<del>7.5</del>	<del>24 x 10<sup>6</sup></del>	<del>17</del>
201	<del>10.0</del>	<del>24 x 10<sup>6</sup></del>	<del>17</del>
202	<del>10 to 30</del>	<del>14 x 10<sup>6</sup></del>	<del>10</del>
203			

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

204  
205  
206  
207  
208  
209

"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.



**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247

"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).

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

250

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

252

253 (Source: Added at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

254

255 SUBPART C: STANDARDS AND LIMITATIONS

256

257 **Section 1000.301 Permissible Levels of Radiation in Unrestricted Areas**

258

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

262

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

266

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

271

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

276

277 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

278

279 **Section 1000.302 Radioactive Emissions to Unrestricted Areas**

280

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

286 than one year.

287

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

295

296 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

297

298 SUBPART D: ADDITIONAL REQUIREMENTS

299

300 **Section 1000.401 Applicability**

301

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

305

306 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

307

308 **Section 1000.402 Definitions**

309

310 As used in this Subpart:

311

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

314

315

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

320

321

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

324 fuel cycle is conducted.

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

"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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

364

365 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

366

367 **Section 1000.403 Environmental Standards for Uranium Fuel Cycle**

368

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

371

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

377

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

383

384 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

385

386 SUBPART E: RECORDS

387

388 **Section 1000.501 Records**

389

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

393

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

396

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

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

400

401 c) Environmental Impact Appraisal, Draft and Final Environmental Impact  
402 Statement, Negative Declaration, or other document prepared by the NRC under  
403 10 CFR 51, incorporated by reference in Section 1000.202.

404

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

407

408 e) Application for Amendment to Operating License.

409

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

413

414 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

415

**416 Section 1000.502 Notification of Incidents**

417

418 ~~All~~ person subject to this Part ~~must shall~~ must immediately notify by telephone ~~and telegraph,~~  
419 ~~or electronic mail, mailgram, or facsimile,~~ the Illinois Emergency Management Agency (IEMA)  
420 ~~Manager of the Office of Nuclear Facility Safety of the Illinois Department of Nuclear Safety,~~  
421 ~~1035 Outer Park Drive, Springfield, Illinois 62704,~~ of any incident or condition arising from the  
422 use or possession of licensed materials or facilities or the conducting of licensed activities which  
423 may have caused or threatens to cause emissions or radiation levels in excess of those allowed  
424 under this Part. IEMA's 24-hour Operations Center can be reached for notification of incidents  
425 at 1-800-782-7860, or, if calling from outside Illinois, 1-217-782-7860.

426

427 (Source: Amended at 46 Ill. Reg. ~~—~~ \_\_\_\_\_, effective \_\_\_\_\_)

428

**429 Section 1000.503 Other Provisions**

430

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

432

433 b) All persons subject to this Part are subject to the requirements and provisions of  
434 35 Ill. Adm. Code 201.122, 201.123, ~~201.124~~, 201.125, 201.126, 201.141,  
435 201.150 and 201.151.

436

437 (Source: Amended at 46 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_)

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

**439Section 1000.APPENDIX A Concentrations in Air Above Natural Background  
440**

Element (atomic number)	Isotope <sup>(1)</sup>		μCi/ml
Actinium (89)	AC 227	S	<del>S</del> 8 x 10 <sup>-14</sup>
		I	<del>I</del> 9 x 10 <sup>-13</sup>
	AC 228	S	<del>AC-228S</del> 3 x 10 <sup>-9</sup>
		I	<del>I</del> 6 x 10 <sup>-10</sup>
Americium (95)	Am 241	<del>S</del>	2 x 10 <sup>-13</sup>
		I	<del>I</del> 4 x 10 <sup>-12</sup>
	Am 242m	S	Am 242mS2 x 10 <sup>-13</sup>
		I	<del>I</del> 9 x 10 <sup>-12</sup>
	Am 242	S	<del>Am-242S</del> 1 x 10 <sup>-9</sup>
		I	<del>I</del> 2 x 10 <sup>-9</sup>
	Am 243	S	<del>Am-243S</del> 2 x 10 <sup>-13</sup>
I		<del>I</del> 4 x 10 <sup>-12</sup>	
Antimony	Sb 122	S	<del>S</del> 6 x 10 <sup>-9</sup>
		I	<del>I</del> 5 x 10 <sup>-9</sup>
	Sb 124	S	<del>Sb-124S</del> 5 x 10 <sup>-9</sup>
		I	<del>I</del> 7 x 10 <sup>-10</sup>
Argon (18)	A 37	S	<del>S</del> ub <sup>2</sup> 1 x 10 <sup>-4</sup>
		I	<del>I</del> 9 x 10 <sup>-10</sup>
	A 41	Sub	<del>A-41Sub</del> 4 x 10 <sup>-8</sup>
Arsenic (33)	As 73	S	<del>S</del> 7 x 10 <sup>-8</sup>
		I	<del>I</del> 1 x 10 <sup>-8</sup>
	As 74	S	<del>As-74S</del> 1 x 10 <sup>-8</sup>
		I	<del>I</del> 4 x 10 <sup>-9</sup>
	As 76	S	<del>As-76S</del> 4 x 10 <sup>-9</sup>
		I	<del>I</del> 3 x 10 <sup>-9</sup>
Astatine (85)	At 211	S	<del>S</del> ub <sup>2</sup> 2 x 10 <sup>-8</sup>
		I	<del>I</del> 1 x 10 <sup>-8</sup>
Barium (56)	Ba 131	S	2 x 10 <sup>-10</sup>
		I	1 x 10 <sup>-9</sup>
		S	4 x 10 <sup>-8</sup>

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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



~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

Curium (96)	Cm 242	I	4 x 10 <sup>-8</sup>
		S	4 x 10 <sup>-12</sup>
	Cm 243	I	6 x 10 <sup>-12</sup>
		S	2 x 10 <sup>-13</sup>
	Cm 244	I	3 x 10 <sup>-12</sup>
		S	3 x 10 <sup>-13</sup>
	Cm 245	I	3 x 10 <sup>-12</sup>
		S	2 x 10 <sup>-13</sup>
	Cm 246	I	4 x 10 <sup>-12</sup>
		S	2 x 10 <sup>-13</sup>
Cm 247	I	4 x 10 <sup>-12</sup>	
	S	2 x 10 <sup>-13</sup>	
Cm 248	I	4 x 10 <sup>-12</sup>	
	S	2 x 10 <sup>-14</sup>	
Cm 249	I	4 x 10 <sup>-13</sup>	
	S	4 x 10 <sup>-7</sup>	
Dysprosium (66)	Dy 165	I	4 x 10 <sup>-7</sup>
		S	9 x 10 <sup>-8</sup>
	Dy 166	I	7 x 10 <sup>-8</sup>
Einsteinium (99)	Es 253	S	8 x 10 <sup>-9</sup>
		I	7 x 10 <sup>-9</sup>
	Es 254m	S	3 x 10 <sup>-11</sup>
		I	2 x 10 <sup>-11</sup>
	Es 254	S	2 x 10 <sup>-10</sup>
Erbium (68)	Er 169	I	2 x 10 <sup>-10</sup>
		S	6 x 10 <sup>-13</sup>
	Er 171	I	4 x 10 <sup>-12</sup>
		S	2 x 10 <sup>-11</sup>
Europium (63)	Eu 152 (T/2= <del>9.22</del> <u>9.2</u> hrs) <del>I</del>	I	1 x 10 <sup>-11</sup>
		S	1 x 10 <sup>-8</sup>
	Eu 152 (T/2=13 yrs) <del>I</del>	I	1 x 10 <sup>-8</sup>
		S	4 x 10 <sup>-10</sup>
		I	<del>1 x 10<sup>-8</sup></del>
		I	<del>6 x 10<sup>-10</sup></del>

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

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

**POLLUTION CONTROL BOARD**

**NOTICE OF PROPOSED AMENDMENTS**

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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



~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

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

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

	Y 91m	S	8 x 10 <sup>-7</sup>	
		I	6 x 10 <sup>-7</sup>	
	Y 91	S	1 x 10 <sup>-9</sup>	
		I	1 x 10 <sup>-9</sup>	
	Y 92	S	1 x 10 <sup>-8</sup>	
		I	1 x 10 <sup>-8</sup>	
	Y 93	S	6 x 10 <sup>-9</sup>	
		I	5 x 10 <sup>-9</sup>	
Zinc (30)	Zn 65	S	4 x 10 <sup>-9</sup>	
		I	2 x 10 <sup>-9</sup>	
	Zn 69m	S	1 x 10 <sup>-8</sup>	
		I	1 x 10 <sup>-8</sup>	
	Zn 69	S	2 x 10 <sup>-7</sup>	
		I	3 x 10 <sup>-7</sup>	
Zirconium (40)	Zr 93	S	4 x 10 <sup>-9</sup>	
		I	1 x 10 <sup>-8</sup>	
	Zr 95	S	4 x 10 <sup>-9</sup>	
		I	1 x 10 <sup>-9</sup>	
	Zr 97	S	4 x 10 <sup>-9</sup>	
		I	3 x 10 <sup>-9</sup>	
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 x 10 <sup>-6</sup>	
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 x 10 <sup>-10</sup>	

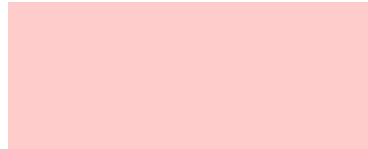
~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.



2 x 10<sup>-14</sup>



441

442<sup>1</sup>Soluble (S); Insoluble (I).

443

444<sup>2</sup>"Sub" means that values given are for submersion in a semispherical infinite cloud of airborne material.

446

447<sup>3</sup>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 x 10<sup>5</sup> MeV of alpha particle energy.)

453

454<sup>4</sup>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 x 10<sup>-7</sup> 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:

458

459 SA=3.6 x 10<sup>-7</sup> curies/gram U..... U-depleted

460

461 SA=(0.4 + 0.38 E + 0.0034 E<sup>2</sup>) 10<sup>-6</sup>..... E ~~>~~ than ~~>~~ 0.72

462

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

464

465NOTE: 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:

467

4681. 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").

473

474 EXAMPLE: If radionuclides A, B, and C are present in concentrations C<sub>A</sub>, C<sub>B</sub>, C<sub>C</sub>, and

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

475 if the applicable MPC's are MPC<sub>A</sub>, and MPC<sub>B</sub>, and MPC<sub>C</sub> respectively, then the  
476 concentrations ~~must~~shallmust be limited so that the following relationship exists:

477  
478 
$$(C_A/MPC_A) + (C_B/MPC_B) + (C_C/MPC_C) \leq \text{than} \leq 1$$
  
479

4802. If either the identity or the concentration of any radionuclide in the mixture is not known,  
481 the limiting values ~~for purposes of~~ Appendix A ~~must~~shallmust be  $2 \times 10^{-14}$ .  
482

4833. If any of the conditions specified below are met, the corresponding values specified  
484 below may be used in lieu of those specified in paragraph 2 above.  
485

486 a. If the identity of each radionuclide in the mixture is known but the concentration  
487 of one or more of the radionuclides in the mixture is not known, the concentration  
488 limit for the mixture is the limit specified in Appendix A for the radionuclide in  
489 the mixture having the lowest concentration limit; or  
490

491 b. If the identity of each radionuclide in the mixture is not ~~now~~ known, but it is  
492 known that ~~certain~~ radionuclides specified in Appendix A are not present in the  
493 mixture, the concentration limit for the mixture is the lowest concentration limit  
494 specified in Appendix A for any radionuclide which is not known to be absent  
495 from the mixture; or  
496

497 c. Element (atomic number) and isotope.  $\mu\text{Ci/ml}$   
498

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.  $1 \times 10^{-10}$

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

If it is known that alpha-emitters and Ac 227 are not present.  $1 \times 10^{-12}$

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.  $1 \times 10^{-13}$

~~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  $3 \times 10^{-12}$  ~~-12~~  $\mu\text{Ci/ml}$  gross alpha activity;  $2 \times 10^{-12}$   ~~$\mu\text{Ci}$~~   $\mu\text{Ci/ml}$  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.,  ~~$C_A/MPC_A \leq MPC_A$~~   $CA \leq MPC_A$   ~~$\leq$~~   $\leq$  ~~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.,  $(CA/MPCA + C_B/MPC_B + \dots + C_N/MPC_N) <$  than  
517 1/4).  
518  
519

521 (Source: Amended at 46 Ill. Reg. ~~\_\_\_\_\_~~, effective ~~\_\_\_\_\_~~)

Document comparison by Workshare Compare on Wednesday, May 4, 2022  
11:01:55 AM

Input:	
Document 1 ID	file:///I:/Input/Agency Rulemakings - Files Received\2022\Volume 46, Issue 19\35-1000-Agency Proposed.docx
Description	35-1000-Agency Proposed
Document 2 ID	file:///I:/Input/Agency Rulemakings - Files Received\2022\Volume 46, Issue 19\35-1000-JCAR r01.docx
Description	35-1000-JCAR r01
Rendering set	Standard

Legend:	
<a href="#">Insertion</a>	
<del>Deletion</del>	
<del>Moved from</del>	
<u>Moved to</u>	
Style change	
Format change	
<del>Moved deletion</del>	
Inserted cell	
Deleted cell	
Moved cell	
Split/Merged cell	
Padding cell	

Statistics:	
	Count
Insertions	104
Deletions	214
Moved from	0
Moved to	0
Style changes	0
Format changes	0



Total changes	318
---------------	-----