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New Jersey Radiation Protection Code

Chapter 1 GENERAL REQUIREMENTS

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A copy of Chapter I of the New Jersey Radiation Protection Code is enclosed for your information. This Chapter covers General Requirements applicable to all radiation sources including radiation producing machines as well as radioactive materials. It prescribes limits which govern exposure of personnel to radiation and concentrations of radioactive material, concentrations of radioactive material which may be discharged into air and water and disposal of radioactive wastes. It also establishes certain requirements for the maintenance of records concerned with radiation exposures and measurements of radiation levels.

If you require additional copies of this Chapter, they may be obtained by writing to the Radiological Health Program, New Jersey State Department of Health, Trenton 25, New Jersey.

NEW JERSEY RADIATION PROTECTION CODE

Chapter 1
GENERAL REQUIREMENTS

Promulgated by
COMMISSION ON RADIATION PROTECTION
New Jersey State Department of Health

Effective Date: February 1, 1961
Filed with the Secretary of State: November 29, 1960

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NEW JERSEY RADIATION PROTECTION CODE

Pursuant to authority vested in it under Chapter 116, P.L. 1958, the Commission on Radiation Protection does this 11th day of November 1960, promulgate and adopt Chapter I of the New Jersey Radiation Protection Code as set forth below to become effective the 1st day of February, 1961.

(Signed) Frank G. Dunnington
Chairman

NEW JERSEY RADIATION PROTECTION CODE

CHAPTER I—GENERAL REQUIREMENTS

SECTION 1 — PURPOSE AND RESPONSIBILITY

Purpose

The purpose of this Code is to prohibit and prevent unnecessary radiation defined in the Radiation Protection Act (Chapter 116, P.L. 1958).

Responsibility

Owners and all persons installing and using sources of radiation shall be responsible for compliance with the provisions of this Code.

SECTION 2 — DEFINITIONS

The following terms as used in this Code shall mean and include:

Air-borne Radioactivity Area—An area accessible to individuals, in which air-borne radioactive materials are present in concentrations such that the: (a) values at any time are in excess of the respective values stated in Section 7.5, Column B, or prorated values if more than one isotope is present; or (b) values averaged over one work week are in excess of 25% of the respective foregoing values.

Area—A bounded space such as a room, floor, building, plant or any designated geographical entity having physical or imaginary boundaries.

Average Dose Rate—An integrated or accumulated dose of radiation divided by the time over which the integration or accumulation took place or by a specified length of time.

Contamination—Means radioactive contamination.

Contamination Hazard—A condition or situation which might result in an exposure of an individual to radioactive materials in excess of the maximum permissible concentrations. (See Radiation Hazard)

Controlled Area—Any area in which the access, occupancy and activity of those within are subject to control and supervision and which contains or may contain a radiation or contamination hazard.

Department—The New Jersey State Department of Health.

Dose—A quantity of radiation delivered at a given point.

Dose Rate—Dose per unit time.

- 2.10 Emergency Exposure**—An exposure to radiation of an emergency worker during rescue or other emergency operations.
- 2.11 Emergency Worker**—A member of the owner's staff or of a public voluntary or governmental agency engaged in safety or other emergency operations.
- 2.12 Hazard**—Same as Radiation Hazard.
- 2.13 High Radiation Area**—An area surrounding sources which is accessible to individuals and in which there exists radiation at such dose rates that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.
- 2.14 Installation**—A radiation source, with its associated equipment, and the area in which it is housed.
- 2.15 Instructed Individual**—An individual who has received appropriate instructions as to the safe means and methods of performing work with or near radiation sources.
- 2.16 Maximum Permissible Dose**—The maximum dose to which the body or a particular part of the body of a person shall be permitted to be exposed continuously or intermittently in a stated period of time.
- 2.17 Monitoring**—A periodic or continuous determination of the radiation dose, or dose rate, or of radioactive contamination.
- 2.18 Owner**—A person who has title to or possession as lessee or bailee of a radiation source.
- 2.19 Person**—Means: (1) an individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, federal agency, municipality, any state, foreign government, or nation, or other legal entity; (2) any legal successor, representative, agent, or agency of the foregoing.
- 2.20 Qualified Individual**—An individual suited by training and experience to perform dependable radiation surveys and to determine the degree of radiation hazard.
- 2.21 Radiation Area**—An area surrounding radiation sources which is accessible to individuals and in which there exists radiation at such dose rates that a major portion of the body could receive in any one hour a dose in excess of 5 millirems, or in any work week a dose in excess of 100 millirems.
- 2.22 Radiation Hazard**—A condition or situation which might result in an exposure of individuals to radiation in excess of the maximum permissible dose. (See Contamination Hazard)
- 2.23 Radiation Incident**—Any unexpected event, occurrence or circumstance involving radiation exposure or radioactive contamination.
- 2.24 Radiation Producing Machine**—A machine or device capable of generating radiation, such as X-ray producing machines, particle accelerators, high voltage rectifiers, high voltage projection equipment, electron microscopes and other types of high voltage machines.
- 2.25 Radiation Source**—Same as Source of Radiation.
- 2.26 Radioactive Material**—A natural or artificially produced substance (solid, liquid or gas) which emits radiation spontaneously.

- 2.27 Sealed Source**—A quantity of radioactive material so enclosed as to prevent the escape of any radioactive material, but at the same time permitting radiation to emerge.
- 2.28 Shall**—Indicates a mandatory requirement.
- 2.29 Shielding**—Any material introduced into the path of radiation to reduce the dose rate at any particular point.
- 2.30 Should**—Indicates an advisory recommendation.
- 2.31 Source of Radiation**—A material, equipment or machine emitting or capable of emitting radiation.
- 2.32 State**—The State of New Jersey.
- 2.33 Survey**—Evaluation of actual or potential radiation or contamination hazards by or under the supervision of a qualified individual.
- 2.34 Unnecessary Radiation**—The use of gamma rays, X-rays, alpha and beta particles, high speed electrons, neutrons, protons, and other atomic or nuclear particles in such a manner as to be injurious or dangerous to the health of the people or the industrial or agricultural potentials of the State. (As defined in the Radiation Protection Act, Chapter 116, P.L. 1958).
- 2.35 User**—Any individual who personally utilizes or manipulates a source of radiation.

SECTION 3 — USE OF SOURCES OF RADIATION

3.1 Supervision

All radiation installations shall be under the supervision of a qualified individual, or of an instructed individual who by training and experience is competent to assume the responsibilities for compliance with this Code. The owner shall designate this qualified or instructed individual on the registration forms provided by the Department.

3.2 Instruction

All persons working with or in the vicinity of radiation producing machines or radioactive materials shall be properly and adequately instructed in the use of necessary safeguards and procedures and be supplied with such safety devices as may be required. All visitors to radiation areas shall be adequately instructed or escorted to prevent unnecessary exposure.

3.3 Authorized Use of Radiation Sources

The owner shall take adequate measures to prevent radiation producing machines and radioactive materials from being used or possessed by individuals other than those specifically authorized by the owner.

3.4 Unattended Radiation Sources

When radiation producing machines or radioactive materials are left unattended, adequate measures shall be taken to prevent their use or possession by any unauthorized individual.

3.5 Faulty Radiation Installations

Whenever any shielding is found to be defective or insufficient, or any protective device is found to be insufficient or operating improperly, the owner shall insure that the operation of the installation is either (a) discontinued

and is not resumed until such shielding or device shall have been properly changed, augmented or repaired, or (b) is operated with sufficient additional precautions during the period of repair.

3.6 Intentional Human Irradiation

Only persons licensed or otherwise permitted by law shall arrange for irradiation of or apply radiation to a human being or integral part thereof.

SECTION 4 — EXEMPTIONS

4.1 Exempt Quantities of Radioactive Materials

The provisions of Section 5 covering Registration, Section 8 on Area Radiation Surveys and Personnel Monitoring, Section 9 on Records, Section 11 on Labeling and Posting, and Section 12 on Storage of Radioactive Materials shall not apply to any quantity of a radioactive material equal to or less than that listed in Section 4.6; provided that no individual user of radioactive materials shall have more than ten such quantities at any one time; provided further that any sealed source containing a quantity of radioactive material less than one-tenth that listed in Section 4.6, Column B, shall not be included in a tabulation of the number of exempt quantities in the possession of any individual user. Such quantities of radioactive materials shall not be exempt if they are stored, used, or handled in such quantity or fashion that any individual might receive a radiation dose exceeding the limits established in Section 7.2.1.

4.2 Exempt Concentrations of Radioactive Materials

The provisions of Section 5 covering Registration, Section 8 on Area Radiation Surveys and Personnel Monitoring, Section 9 on Records, Section 11 on Labeling and Posting, and Section 12 on Storage of Radioactive Materials shall not apply to gases in which the concentration of radioactive material is not in excess of the values listed in Section 7.5, Column D, nor to liquids or solids in which the concentration of radioactive material is not in excess of the values listed in Section 7.5, Column C, provided that in all cases prorated values shall be used if more than one isotope is present.

4.3 Exempt Radiation Producing Machines and Devices

The provisions of Section 5 covering Registration, Section 8 on Area Radiation Surveys and Personnel Monitoring, Section 9 on Records, and Section 11 on Labeling and Posting shall not apply to the following machines and devices:

- 4.3.1 Radiation producing machines not being used in a manner as to produce radiation, such as equipment in storage or on display.
- 4.3.2 Electrical equipment that is not primarily intended to produce radiation and that does not produce radiation greater than 0.5 mr/hr at any readily accessible point 5 centimeters from the surface. Such equipment shall not be exempt if it is used or handled in such a manner that any individual might receive a radiation dose exceeding the limits established in Section 7.2.1.
- 4.3.3 Time pieces, instruments, novelties or devices containing self-luminescent components, except during the manufacture or manufacturing assembly of the self-luminescent components themselves. Such time pieces, instruments, novelties or devices shall not be

exempt if they are stored, used or handled in such quantity or fashion that any individual might receive a radiation dose exceeding the limits established in Section 7.2.1.

4.4 Exemptions for Prevention or Control of Diseases

Regulations contained in Sections 7, 8, or 16.2 shall not apply insofar as they relate to the individual undergoing irradiation for the purpose of diagnosis, treatment or investigation for the prevention or control of disease.

4.5 Special Exemptions

The Department, upon request by an owner or on its own initiative with the approval of the Commission, may grant a specific exemption from any requirement of this Code should it determine that such exemption is not likely to result in unnecessary radiation.

4.6 Table of Exempt Quantities

Radionuclide	COLUMN A Unsealed (Microcuries)	COLUMN B Sealed (Microcuries)
Actinium 227	0.1	1
Americium 241	0.1	1
Antimony 124	1	10
Arsenic 73	10	100
Arsenic 74	10	100
Arsenic 76	10	100
Arsenic 77	10	100
Astatine 211	0.1	10
Barium-Lanthanum 140	1	10
Beryllium 7	100	1000
Bromine 82	10	100
Cadmium-Silver 109	10	100
Calcium 45	1	10
Carbon 14	1000	10000
Cerium-Praseodymium 144	1	10
Cesium-Barium 137	10	100
Chlorine 36	10	100
Chromium 51	100	1000
Cobalt 58	10	100
Cobalt 60	10	100
Copper 64	10	100
Curium 242	0.1	1
Europium 154	1	10
Fluorine 18	100	1000
Gallium 72	10	100
Germanium 71	100	1000

Radionuclide	COLUMN A Unsealed (Microcuries)	COLUMN B Sealed (Microcuries)
Gold 196	10	100
Gold 198	10	100
Gold 199	10	100
Holmium 166	10	100
Hydrogen (Tritium) 3	1000	10000
Indium 114	1	10
Iodine 131	1	10
Iodine 132	10	100
Iridium 190	10	100
Iridium 192	10	100
Iron 55	10	100
Iron 59	1	10
Krypton 85	1000	10000
Lanthanum 140	10	100
Lead 203	10	100
Lead 210 + dtrs	0.1	1
Lutecium 177	10	100
Manganese 52	10	100
Manganese 54	10	100
Manganese 56	10	100
Molybdenum 99	10	100
Nickel 59	10	100
Nickel 63	10	100
Niobium 95	10	100
Palladium-Silver 109	10	100
Palladium-Rhodium 103	10	100
Phosphorus 32	10	100
Platinum 191	10	100
Platinum 193	10	100
Plutonium 239	0.1	1
Polonium 210	0.1	1
Potassium 42	10	100
Praseodymium 143	10	100
Promethium 147	10	100
Radium 226	0.1	1
Rhenium 183	10	100
Rhenium 186	10	100
Rhodium 105	10	100
Rubidium 86	10	100

Radionuclide	COLUMN A Unsealed (Microcuries)	COLUMN B Sealed (Microcuries)
Ruthenium 103	10	100
Ruthenium -Rhodium 106	1	10
Samarium 151	1	10
Samarium 153	10	100
Scandium 46	10	100
Scandium 47	10	100
Scandium 48	10	100
Silver 105	10	100
Silver 110	10	100
Silver 111	10	100
Sodium 22	10	100
Sodium 24	10	100
Strontium 89	1	10
Strontium-Yttrium 90	0.1	1.0
Sulfur 35	10	100
Tantalum 182	10	100
Technetium 96	1	10
Technetium 99	1	10
Tellurium 127	10	100
Tellurium 129	10	100
Thallium 200	10	100
Thallium 201	100	1000
Thallium 202	10	100
Thallium 204	10	100
Thorium nat.	100	1000
Thorium-Protoactinium 234	1	10
Thulium-Ytterbium 170	1	10
Tin 113	10	100
Tungsten 181	10	100
Tungsten 185	10	100
Uranium 233	0.1	1
Uranium natural	1000	10000
Vanadium 48	10	100
Yttrium 91	1	10
Zinc 65	10	100
Zirconium Niobium 95	10	100
Any beta and/or gamma emitter not listed above	1	10
Any alpha emitter not listed above	0.1	1

SECTION 5 — REGISTRATION

Registration of radiation producing machines and radioactive materials shall be in accordance with regulations promulgated by the State Department of Health pursuant to authority vested in it under Chapter 116, P.L. 1958.

SECTION 6 — CONTROLLED AREAS

6.1 Areas which must be Controlled

- 6.1.1 Every area in which there is any reasonable possibility of an occupant receiving more than the radiation doses specified in Section 7.2 shall be set apart as a controlled area.
- 6.1.2 The limitations of this Section shall not be applicable to outgoing or incoming shipments of radioactive material transported in conformance with the regulations of Section 14.

6.2 Limitations on Controlled Areas

No area within a controlled area shall be used for residential quarters, although a room or rooms in residential buildings may be set apart as a controlled area.

SECTION 7 — PERMISSIBLE DOSES AND CONCENTRATIONS

7.1 Exposure of Individuals in Controlled Areas

- 7.1.1 For individuals within a controlled area the dose accumulated from sources of radiation outside the body to the whole body, head and trunk, active blood-forming organs, gonads, or lens of the eyes, in any one year, shall not exceed 5 rems; and the dose accumulated in any period of 13 consecutive weeks shall not exceed 3 rems.
- 7.1.2 For individuals within a controlled area the dose accumulated from sources of radiation outside the body to only the skin of the whole body in any one year, shall not exceed 30 rems; and the dose accumulated in any period of 13 consecutive weeks shall not exceed 10 rems.
- 7.1.3 For individuals within a controlled area the dose accumulated to the hands and forearms, and the feet and ankles shall not exceed 75 rems in any one year; and the dose accumulated in any 13 consecutive weeks shall not exceed 25 rems.
- 7.1.4 For individuals within a controlled area, the radiation dose to tissues of the body from radioactive materials within the body shall be controlled by limiting the average rates at which such materials are taken into the body. Where this intake results from the occurrence of radioactive materials in the air or water, the concentration of the radioisotopes in the air or water, averaged over any seven consecutive days, shall not be permitted to exceed the concentrations listed in Section 7.5, Columns A and B, or prorated values if more than one isotope is present. The limits given in Section 7.5, Columns A and B, are based upon exposure to the concentrations specified for forty hours in any period of

seven consecutive days. In any such period where the number of hours of exposure is less than forty, the limits specified in the table may be increased proportionately. In any such period, where the number of hours of exposure is greater than forty, the limits specified in the table shall be decreased proportionately.

7.1.5 The exposure of any individual under 18 years of age shall not exceed the limits established in Section 7.2.

7.2 Dose Rates and Concentrations Outside Controlled Areas

7.2.1 The dose rate at any point outside the confines of the controlled area shall be limited to a value such that there is no reasonable possibility that any individual outside the controlled area will receive a radiation dose to the whole body, head and trunk, active blood-forming organs, gonads, or lens of the eyes, in excess of 0.5 rem in any one year. Where this dose results from the occurrence of radioactive materials in the air or water, the average concentrations of such materials in the air or water, averaged over any 12 consecutive months, shall not exceed one-tenth the concentrations listed in Section 7.5, Columns C and D, or prorated values if more than one isotope is present.

7.2.2 The limitations of this Section shall not be applicable to outgoing or incoming shipments of radioactive materials transported in conformance with the regulations of Section 14.

7.3 Concentrations in Effluents from Controlled Areas

Concentrations of radioactive materials in effluents from controlled areas shall meet the requirements of Section 13, Disposal of Radioactive Materials.

7.4 Exposures in the Event of Radiation Incidents or Emergencies

In the event of a radiation incident in which an employee or emergency worker is exposed beyond the limits specified in Section 7.1.1, or in the event of emergency conditions in which immediate action required to minimize danger to life or serious loss of property results in the exposure to an employee or emergency worker beyond the limits specified in Section 7.1.1, each employer shall take measures to limit additional exposure of his employees to an extent and for a period, which shall be subject to approval by the Department. All such exposures shall be reported as required by Section 16 and shall be included in the records required by Section 9.

5 Maximum Permissible Average Concentrations of Radioactive Materials in Air and Water for Occupational Exposure

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Ct-227	(sol.)	6×10^{-5}	2×10^{-12}	2×10^{-5}	8×10^{-13}
	(insol.)	9×10^{-3}	3×10^{-11}	3×10^{-3}	9×10^{-12}
Ct-228	(sol.)	3×10^{-3}	8×10^{-8}	9×10^{-4}	3×10^{-8}
	(insol.)	3×10^{-3}	2×10^{-8}	9×10^{-4}	6×10^{-9}
Po-210	(sol.)	10^{-4}	6×10^{-12}	4×10^{-5}	2×10^{-12}
	(insol.)	8×10^{-4}	10^{-10}	2×10^{-4}	4×10^{-11}
Po-210	(sol.)	10^{-4}	6×10^{-12}	4×10^{-5}	2×10^{-12}
	(insol.)	8×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
Sb-125	(sol.)	8×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
	(insol.)	8×10^{-4}	10^{-7}	3×10^{-4}	5×10^{-8}
Sb-125	(sol.)	7×10^{-4}	2×10^{-7}	2×10^{-4}	5×10^{-8}
	(insol.)	7×10^{-4}	2×10^{-8}	2×10^{-4}	7×10^{-9}
Sb-125	(sol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	3×10^{-8}	10^{-3}	9×10^{-9}
Ar-37	(imm.)	.....	6×10^{-3}	.....	10^{-3}
Ar-41	(imm.)	.....	2×10^{-6}	.....	4×10^{-7}
Po-210	(sol.)	0.01	2×10^{-6}	5×10^{-3}	7×10^{-7}
	(insol.)	0.01	4×10^{-7}	5×10^{-3}	10^{-7}
Po-210	(sol.)	2×10^{-3}	3×10^{-7}	5×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	10^{-7}	5×10^{-4}	4×10^{-8}
Po-210	(sol.)	6×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
	(insol.)	6×10^{-4}	10^{-7}	2×10^{-4}	3×10^{-8}
Po-210	(sol.)	2×10^{-3}	5×10^{-7}	8×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	4×10^{-7}	8×10^{-4}	10^{-7}
Ra-226	(sol.)	5×10^{-5}	7×10^{-9}	2×10^{-5}	2×10^{-9}
	(insol.)	2×10^{-3}	3×10^{-8}	7×10^{-4}	10^{-8}
Ra-226	(sol.)	5×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
	(insol.)	5×10^{-3}	4×10^{-7}	2×10^{-3}	10^{-7}
Ra-226	(sol.)	8×10^{-4}	10^{-7}	3×10^{-4}	4×10^{-8}
	(insol.)	7×10^{-4}	4×10^{-8}	2×10^{-4}	10^{-8}
Ra-226	(sol.)	0.02	9×10^{-10}	6×10^{-3}	3×10^{-10}
	(insol.)	0.02	10^{-7}	6×10^{-3}	4×10^{-8}
Ra-226	(sol.)	0.05	6×10^{-6}	0.02	2×10^{-6}
	(insol.)	0.05	10^{-6}	0.02	4×10^{-7}
Ra-226	(sol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
	(insol.)	10^{-3}	10^{-7}	4×10^{-4}	5×10^{-8}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Bismuth 207	(sol.)	2×10^{-3}	2×10^{-7}	6×10^{-4}	6×10^{-8}
	(insol.)	2×10^{-3}	10^{-8}	6×10^{-4}	5×10^{-9}
Bismuth 210	(sol.)	10^{-3}	6×10^{-9}	4×10^{-4}	2×10^{-9}
	(insol.)	10^{-3}	6×10^{-9}	4×10^{-4}	2×10^{-9}
Bismuth 212	(sol.)	0.01	10^{-7}	4×10^{-3}	3×10^{-8}
	(insol.)	0.01	2×10^{-7}	4×10^{-3}	7×10^{-8}
Bromine 82	(sol.)	8×10^{-3}	10^{-6}	3×10^{-3}	4×10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
Cadmium 109	(sol.)	5×10^{-3}	5×10^{-8}	2×10^{-3}	2×10^{-8}
	(insol.)	5×10^{-3}	7×10^{-8}	2×10^{-3}	3×10^{-8}
Cadmium 115m	(sol.)	7×10^{-4}	4×10^{-8}	3×10^{-4}	10^{-8}
	(insol.)	7×10^{-4}	4×10^{-8}	3×10^{-4}	10^{-8}
Cadmium 115	(sol.)	10^{-3}	2×10^{-7}	3×10^{-4}	8×10^{-8}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
Calcium 45	(sol.)	3×10^{-4}	3×10^{-8}	9×10^{-5}	10^{-8}
	(insol.)	5×10^{-3}	10^{-7}	2×10^{-3}	4×10^{-8}
Calcium 47	(sol.)	10^{-3}	2×10^{-7}	5×10^{-4}	6×10^{-8}
	(insol.)	10^{-3}	2×10^{-7}	3×10^{-4}	6×10^{-8}
Californium 249	(sol.)	10^{-4}	2×10^{-12}	4×10^{-5}	5×10^{-13}
	(insol.)	7×10^{-4}	10^{-10}	2×10^{-4}	3×10^{-11}
Californium 250	(sol.)	4×10^{-4}	5×10^{-12}	10^{-4}	2×10^{-12}
	(insol.)	7×10^{-4}	10^{-10}	3×10^{-4}	3×10^{-11}
Californium 252	(sol.)	7×10^{-4}	2×10^{-11}	2×10^{-4}	7×10^{-12}
	(insol.)	7×10^{-4}	10^{-10}	2×10^{-4}	4×10^{-11}
Carbon 14	(sol.)	0.02	4×10^{-6}	8×10^{-3}	10^{-6}
	(imm.)	.....	5×10^{-5}	.....	10^{-5}
Cerium 141	(sol.)	3×10^{-3}	4×10^{-7}	9×10^{-4}	2×10^{-7}
	(insol.)	3×10^{-3}	2×10^{-7}	9×10^{-4}	5×10^{-8}
Cerium 143	(sol.)	10^{-3}	3×10^{-7}	4×10^{-4}	9×10^{-8}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	7×10^{-8}
Cerium 144	(sol.)	3×10^{-4}	10^{-8}	10^{-4}	3×10^{-9}
	(insol.)	3×10^{-4}	6×10^{-9}	10^{-4}	2×10^{-9}
Cesium 131	(sol.)	0.07	10^{-5}	0.02	4×10^{-6}
	(insol.)	0.03	3×10^{-6}	9×10^{-3}	10^{-6}
Cesium 134m	(sol.)	0.2	4×10^{-5}	0.06	10^{-5}
	(insol.)	0.03	6×10^{-6}	0.01	2×10^{-6}
Cesium 134	(sol.)	3×10^{-4}	4×10^{-8}	9×10^{-5}	10^{-8}
	(insol.)	10^{-3}	10^{-8}	4×10^{-4}	4×10^{-9}

Radionuclide	Column	For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
		A	B	C	D
Cesium 135	(sol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	7×10^{-3}	9×10^{-8}	2×10^{-3}	3×10^{-8}
Cesium 136	(sol.)	2×10^{-3}	4×10^{-7}	9×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	2×10^{-7}	6×10^{-4}	6×10^{-8}
Cesium 137	(sol.)	4×10^{-4}	6×10^{-8}	2×10^{-4}	2×10^{-8}
	(insol.)	10^{-3}	10^{-8}	4×10^{-4}	5×10^{-9}
Chlorine 36	(sol.)	2×10^{-3}	4×10^{-7}	8×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	2×10^{-8}	6×10^{-4}	8×10^{-9}
Chlorine 38	(sol.)	0.01	3×10^{-6}	4×10^{-3}	9×10^{-7}
	(insol.)	0.01	2×10^{-6}	4×10^{-3}	7×10^{-7}
Chromium 51	(sol.)	0.05	10^{-5}	0.02	4×10^{-6}
	(insol.)	0.05	2×10^{-6}	0.02	8×10^{-7}
Cobalt 57	(sol.)	0.02	3×10^{-6}	5×10^{-3}	10^{-6}
	(insol.)	0.01	2×10^{-7}	4×10^{-3}	6×10^{-8}
Cobalt 58m	(sol.)	0.08	2×10^{-5}	0.03	6×10^{-6}
	(insol.)	0.06	9×10^{-6}	0.02	3×10^{-6}
Cobalt 58	(sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-8}	9×10^{-4}	2×10^{-8}
Cobalt 60	(sol.)	10^{-3}	3×10^{-7}	5×10^{-4}	10^{-7}
	(insol.)	10^{-3}	9×10^{-9}	3×10^{-4}	3×10^{-9}
Copper 64	(sol.)	0.01	2×10^{-6}	3×10^{-3}	7×10^{-7}
	(insol.)	6×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
Curium 242	(sol.)	7×10^{-4}	10^{-10}	2×10^{-4}	4×10^{-11}
	(insol.)	7×10^{-4}	2×10^{-10}	3×10^{-4}	6×10^{-11}
Curium 243	(sol.)	10^{-4}	6×10^{-12}	5×10^{-5}	2×10^{-12}
	(insol.)	7×10^{-4}	10^{-10}	2×10^{-4}	3×10^{-11}
Curium 244	(sol.)	2×10^{-4}	9×10^{-12}	7×10^{-5}	3×10^{-12}
	(insol.)	8×10^{-4}	10^{-10}	3×10^{-4}	3×10^{-11}
Curium 245	(sol.)	10^{-4}	5×10^{-12}	4×10^{-5}	2×10^{-12}
	(insol.)	8×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
Curium 246	(sol.)	10^{-4}	5×10^{-12}	4×10^{-5}	2×10^{-12}
	(insol.)	8×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
Dysprosium 165	(sol.)	0.01	3×10^{-6}	4×10^{-3}	9×10^{-7}
	(insol.)	0.01	2×10^{-6}	4×10^{-3}	7×10^{-7}
Dysprosium 166	(sol.)	10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-8}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	7×10^{-8}
Erbium 169	(sol.)	3×10^{-3}	6×10^{-7}	9×10^{-4}	2×10^{-7}
	(insol.)	3×10^{-3}	4×10^{-7}	9×10^{-4}	10^{-7}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
171	(sol.)	3×10^{-3}	7×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
m 152	(9.2 hr.)				
	(sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}	6×10^{-4}	10^{-7}
m 152	(13 yr.)				
	(sol.)	2×10^{-3}	10^{-8}	8×10^{-4}	4×10^{-9}
	(insol.)	2×10^{-3}	2×10^{-8}	8×10^{-4}	6×10^{-9}
m 154	(sol.)	6×10^{-4}	4×10^{-9}	2×10^{-4}	10^{-9}
	(insol.)	6×10^{-4}	7×10^{-9}	2×10^{-4}	2×10^{-9}
m 155	(sol.)	6×10^{-3}	9×10^{-8}	2×10^{-3}	3×10^{-8}
	(insol.)	6×10^{-3}	7×10^{-8}	2×10^{-3}	3×10^{-8}
e 18	(sol.)	0.02	5×10^{-6}	8×10^{-3}	2×10^{-6}
	(insol.)	0.01	3×10^{-6}	5×10^{-3}	9×10^{-7}
ium 153	(sol.)	6×10^{-3}	2×10^{-7}	2×10^{-3}	8×10^{-8}
	(insol.)	6×10^{-3}	9×10^{-8}	2×10^{-3}	3×10^{-8}
ium 159	(sol.)	2×10^{-3}	5×10^{-7}	8×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	4×10^{-7}	8×10^{-4}	10^{-7}
72	(sol.)	10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-8}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
ium 71	(sol.)	0.05	10^{-5}	0.02	4×10^{-6}
	(insol.)	0.05	6×10^{-6}	0.02	2×10^{-6}
6	(sol.)	5×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
	(insol.)	4×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
8	(sol.)	2×10^{-3}	3×10^{-7}	5×10^{-4}	10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	5×10^{-4}	8×10^{-8}
9	(sol.)	5×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
	(insol.)	4×10^{-3}	8×10^{-7}	2×10^{-3}	3×10^{-7}
n 181	(sol.)	2×10^{-3}	4×10^{-8}	7×10^{-4}	10^{-8}
	(insol.)	2×10^{-3}	7×10^{-8}	7×10^{-4}	3×10^{-8}
m 166	(sol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	7×10^{-8}
	(insol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
en 3	(sol.)	0.1	2×10^{-5}	0.03	5×10^{-6}
	(imm.)	.....	2×10^{-3}	.....	4×10^{-4}
113m	(sol.)	0.04	8×10^{-6}	0.01	3×10^{-6}
	(insol.)	0.04	7×10^{-6}	0.01	2×10^{-6}
114m	(sol.)	5×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
	(insol.)	5×10^{-4}	2×10^{-8}	2×10^{-4}	7×10^{-9}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Indium 115m	(sol.)	0.01	2x10 ⁻⁶	4x10 ⁻³	8x10 ⁻⁷
	(insol.)	0.01	2x10 ⁻⁶	4x10 ⁻³	6x10 ⁻⁷
Indium 115	(sol.)	3x10 ⁻³	2x10 ⁻⁷	9x10 ⁻⁴	9x10 ⁻⁸
	(insol.)	3x10 ⁻³	3x10 ⁻⁸	9x10 ⁻⁴	10 ⁻⁸
Iodine 126	(sol.)	5x10 ⁻⁵	8x10 ⁻⁹	2x10 ⁻⁵	3x10 ⁻⁹
	(insol.)	3x10 ⁻³	3x10 ⁻⁷	9x10 ⁻⁴	10 ⁻⁷
Iodine 129	(sol.)	10 ⁻⁵	2x10 ⁻⁹	4x10 ⁻⁶	6x10 ⁻¹⁰
	(insol.)	6x10 ⁻³	7x10 ⁻⁸	2x10 ⁻³	2x10 ⁻⁸
Iodine 131	(sol.)	6x10 ⁻⁵	9x10 ⁻⁹	2x10 ⁻⁵	3x10 ⁻⁹
	(insol.)	2x10 ⁻³	3x10 ⁻⁷	6x10 ⁻⁴	10 ⁻⁷
Iodine 132	(sol.)	2x10 ⁻³	2x10 ⁻⁷	6x10 ⁻⁴	8x10 ⁻⁸
	(insol.)	5x10 ⁻³	9x10 ⁻⁷	2x10 ⁻³	3x10 ⁻⁷
Iodine 133	(sol.)	2x10 ⁻⁴	3x10 ⁻⁸	7x10 ⁻⁵	10 ⁻⁸
	(insol.)	10 ⁻³	2x10 ⁻⁷	4x10 ⁻⁴	7x10 ⁻⁸
Iodine 134	(sol.)	4x10 ⁻³	5x10 ⁻⁷	10 ⁻³	2x10 ⁻⁷
	(insol.)	0.02	3x10 ⁻⁶	6x10 ⁻³	10 ⁻⁶
Iodine 135	(sol.)	7x10 ⁻⁴	10 ⁻⁷	2x10 ⁻⁴	4x10 ⁻⁸
	(insol.)	2x10 ⁻³	4x10 ⁻⁷	7x10 ⁻⁴	10 ⁻⁷
Iridium 190	(sol.)	6x10 ⁻³	10 ⁻⁶	2x10 ⁻³	4x10 ⁻⁷
	(insol.)	5x10 ⁻³	4x10 ⁻⁷	2x10 ⁻³	10 ⁻⁷
Iridium 192	(sol.)	10 ⁻³	10 ⁻⁷	4x10 ⁻⁴	4x10 ⁻⁸
	(insol.)	10 ⁻³	3x10 ⁻⁸	4x10 ⁻⁴	9x10 ⁻⁹
Iridium 194	(sol.)	10 ⁻³	2x10 ⁻⁷	3x10 ⁻⁴	8x10 ⁻⁸
	(insol.)	9x10 ⁻⁴	2x10 ⁻⁷	3x10 ⁻⁴	5x10 ⁻⁸
Iron 55	(sol.)	0.02	9x10 ⁻⁷	8x10 ⁻³	3x10 ⁻⁷
	(insol.)	0.07	10 ⁻⁶	0.02	3x10 ⁻⁷
Iron 59	(sol.)	2x10 ⁻³	10 ⁻⁷	6x10 ⁻⁴	5x10 ⁻⁸
	(insol.)	2x10 ⁻³	5x10 ⁻⁸	5x10 ⁻⁴	2x10 ⁻⁸
Krypton 85m	(imm.)	.....	6x10 ⁻⁶	.....	10 ⁻⁶
Krypton 85	(imm.)	.....	10 ⁻⁵	.....	3x10 ⁻⁶
Krypton 87	(imm.)	.....	10 ⁻⁶	.....	2x10 ⁻⁷
Lanthanum 140	(sol.)	7x10 ⁻⁴	2x10 ⁻⁷	2x10 ⁻⁴	5x10 ⁻⁸
	(insol.)	7x10 ⁻⁴	10 ⁻⁷	2x10 ⁻⁴	4x10 ⁻⁸
Lead 203	(sol.)	0.01	3x10 ⁻⁶	4x10 ⁻³	9x10 ⁻⁷
	(insol.)	0.01	2x10 ⁻⁶	4x10 ⁻³	6x10 ⁻⁷
Lead 210	(sol.)	4x10 ⁻⁶	10 ⁻¹⁰	10 ⁻⁶	4x10 ⁻¹¹
	(insol.)	5x10 ⁻³	2x10 ⁻¹⁰	2x10 ⁻³	8x10 ⁻¹¹

Radionuclide	Column	For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
		A	B	C	D
Iodine 131	(sol.)	6×10^{-4}	2×10^{-8}	2×10^{-4}	6×10^{-9}
	(insol.)	5×10^{-4}	2×10^{-8}	2×10^{-4}	7×10^{-9}
Cesium 137	(sol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
Manganese 52	(sol.)	10^{-3}	2×10^{-7}	3×10^{-4}	7×10^{-8}
	(insol.)	9×10^{-4}	10^{-7}	3×10^{-4}	5×10^{-8}
Manganese 54	(sol.)	4×10^{-3}	4×10^{-7}	10^{-3}	10^{-7}
	(insol.)	3×10^{-3}	4×10^{-8}	10^{-3}	10^{-8}
Manganese 56	(sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
Mercury 197m	(sol.)	6×10^{-3}	7×10^{-7}	2×10^{-3}	3×10^{-7}
	(insol.)	5×10^{-3}	8×10^{-7}	2×10^{-3}	3×10^{-7}
Mercury 197	(sol.)	9×10^{-3}	10^{-6}	3×10^{-3}	4×10^{-7}
	(insol.)	0.01	3×10^{-6}	5×10^{-3}	9×10^{-7}
Mercury 203	(sol.)	5×10^{-4}	7×10^{-8}	2×10^{-4}	2×10^{-8}
	(insol.)	3×10^{-3}	10^{-7}	10^{-3}	4×10^{-8}
Rhenium 186	(sol.)	5×10^{-3}	7×10^{-7}	2×10^{-3}	3×10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	7×10^{-8}
Ruthenium 144	(sol.)	2×10^{-3}	8×10^{-11}	7×10^{-4}	3×10^{-11}
	(insol.)	2×10^{-3}	3×10^{-10}	8×10^{-4}	10^{-10}
Ruthenium 147	(sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	2×10^{-7}	6×10^{-4}	8×10^{-8}
Ruthenium 149	(sol.)	8×10^{-3}	2×10^{-6}	3×10^{-3}	6×10^{-7}
	(insol.)	8×10^{-3}	10^{-6}	3×10^{-3}	5×10^{-7}
Ruthenium 237	(sol.)	9×10^{-5}	4×10^{-12}	3×10^{-5}	10^{-12}
	(insol.)	9×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
Ruthenium 239	(sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	4×10^{-3}	7×10^{-7}	10^{-3}	2×10^{-7}
Strontium 89	(sol.)	6×10^{-3}	5×10^{-7}	2×10^{-3}	2×10^{-7}
	(insol.)	0.06	8×10^{-7}	0.02	3×10^{-7}
Strontium 90	(sol.)	8×10^{-4}	6×10^{-8}	3×10^{-4}	2×10^{-8}
	(insol.)	0.02	3×10^{-7}	7×10^{-3}	10^{-7}
Strontium 91	(sol.)	4×10^{-3}	9×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
Strontium 93m	(sol.)	0.01	10^{-7}	4×10^{-3}	4×10^{-8}
	(insol.)	0.01	2×10^{-7}	4×10^{-3}	5×10^{-8}
Strontium 95	(sol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	10^{-7}	10^{-3}	3×10^{-8}

Radionuclide	For 40 Hour Week		For 168 Hour Week	
	Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column	A	B	C	D
Niobium 97 (sol.)	0.03	6×10^{-6}	9×10^{-3}	2×10^{-6}
(insol.)	0.03	5×10^{-6}	9×10^{-3}	2×10^{-6}
Osmium 185 (sol.)	2×10^{-3}	5×10^{-7}	7×10^{-4}	2×10^{-7}
(insol.)	2×10^{-3}	5×10^{-8}	7×10^{-4}	2×10^{-8}
Osmium 191m (sol.)	0.07	2×10^{-5}	0.03	6×10^{-6}
(insol.)	0.07	9×10^{-6}	0.02	3×10^{-6}
Osmium 191 (sol.)	5×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
(insol.)	5×10^{-3}	4×10^{-7}	2×10^{-3}	10^{-7}
Osmium 193 (sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
(insol.)	2×10^{-3}	3×10^{-7}	5×10^{-4}	9×10^{-8}
Palladium 103 (sol.)	0.01	10^{-6}	3×10^{-3}	5×10^{-7}
(insol.)	8×10^{-3}	7×10^{-7}	3×10^{-3}	3×10^{-7}
Palladium 109 (sol.)	3×10^{-3}	6×10^{-7}	9×10^{-4}	2×10^{-7}
(insol.)	2×10^{-3}	4×10^{-7}	7×10^{-4}	10^{-7}
Phosphorus 32 (sol.)	5×10^{-4}	7×10^{-8}	2×10^{-4}	2×10^{-8}
(insol.)	7×10^{-4}	8×10^{-8}	2×10^{-4}	3×10^{-8}
Platinum 191 (sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
(insol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
Platinum 193m (sol.)	0.03	7×10^{-6}	0.01	2×10^{-6}
(insol.)	0.03	5×10^{-6}	0.01	2×10^{-6}
Platinum 193 (sol.)	0.03	10^{-6}	9×10^{-3}	4×10^{-7}
(insol.)	0.05	3×10^{-7}	0.02	10^{-7}
Platinum 197m (sol.)	0.03	6×10^{-6}	0.01	2×10^{-6}
(insol.)	0.03	5×10^{-6}	9×10^{-3}	2×10^{-6}
Platinum 197 (sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
(insol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
Plutonium 238 (sol.)	10^{-4}	2×10^{-12}	5×10^{-5}	7×10^{-13}
(insol.)	8×10^{-4}	3×10^{-11}	3×10^{-4}	10^{-11}
Plutonium 239 (sol.)	10^{-4}	2×10^{-12}	5×10^{-5}	6×10^{-13}
(insol.)	8×10^{-4}	4×10^{-11}	3×10^{-4}	10^{-11}
Plutonium 240 (sol.)	10^{-4}	2×10^{-12}	5×10^{-5}	6×10^{-13}
(insol.)	8×10^{-4}	4×10^{-11}	3×10^{-4}	10^{-11}
Plutonium 241 (sol.)	7×10^{-3}	9×10^{-11}	2×10^{-3}	3×10^{-11}
(insol.)	0.04	4×10^{-8}	0.01	10^{-8}
Plutonium 242 (sol.)	10^{-4}	2×10^{-12}	5×10^{-5}	6×10^{-13}
(insol.)	9×10^{-4}	4×10^{-11}	3×10^{-4}	10^{-11}
Polonium 210 (sol.)	2×10^{-5}	5×10^{-10}	7×10^{-6}	2×10^{-10}
(insol.)	8×10^{-4}	2×10^{-10}	3×10^{-4}	7×10^{-11}

Radionuclide	For 40 Hour Week		For 168 Hour Week	
	Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column	A	B	C	D
Potassium 42 (sol.)	9×10^{-3}	2×10^{-6}	3×10^{-3}	7×10^{-7}
(insol.)	6×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
Praseodymium 142 (sol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	7×10^{-8}
(insol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	5×10^{-8}
Praseodymium 143 (sol.)	10^{-3}	3×10^{-7}	5×10^{-4}	10^{-7}
(insol.)	10^{-3}	2×10^{-7}	5×10^{-4}	6×10^{-8}
Promethium 147 (sol.)	6×10^{-3}	6×10^{-8}	2×10^{-3}	2×10^{-8}
(insol.)	6×10^{-3}	10^{-7}	2×10^{-3}	3×10^{-8}
Promethium 149 (sol.)	10^{-3}	3×10^{-7}	4×10^{-4}	10^{-7}
(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-8}
Protactinium 230 (sol.)	7×10^{-3}	2×10^{-9}	2×10^{-3}	6×10^{-10}
(insol.)	7×10^{-3}	8×10^{-10}	2×10^{-3}	3×10^{-10}
Protactinium 231 (sol.)	3×10^{-5}	10^{-12}	9×10^{-6}	4×10^{-13}
(insol.)	8×10^{-4}	10^{-10}	2×10^{-4}	4×10^{-11}
Protactinium 233 (sol.)	4×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
(insol.)	3×10^{-3}	2×10^{-7}	10^{-3}	6×10^{-8}
Radium 223 (sol.)	2×10^{-5}	2×10^{-9}	7×10^{-6}	6×10^{-10}
(insol.)	10^{-4}	2×10^{-10}	4×10^{-5}	8×10^{-11}
Radium 224 (sol.)	7×10^{-5}	5×10^{-9}	2×10^{-5}	2×10^{-9}
(insol.)	2×10^{-4}	7×10^{-10}	5×10^{-5}	2×10^{-10}
Radium 226 (sol.)	4×10^{-7}	3×10^{-11}	10^{-7}	10^{-11}
(insol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
Radium 228 (sol.)	8×10^{-7}	7×10^{-11}	3×10^{-7}	2×10^{-11}
(insol.)	7×10^{-4}	4×10^{-11}	3×10^{-4}	10^{-11}
Radon 220	.....	3×10^{-7}	.....	10^{-7}
Radon 222	.....	3×10^{-8}	.....	10^{-8}
Rhenium 183 (sol.)	0.02	3×10^{-6}	6×10^{-3}	9×10^{-7}
(insol.)	8×10^{-3}	2×10^{-7}	3×10^{-3}	5×10^{-8}
Rhenium 186 (sol.)	3×10^{-3}	6×10^{-7}	9×10^{-4}	2×10^{-7}
(insol.)	10^{-3}	2×10^{-7}	5×10^{-4}	8×10^{-8}
Rhenium 187 (sol.)	0.07	9×10^{-6}	0.03	3×10^{-6}
(insol.)	0.04	5×10^{-7}	0.02	2×10^{-7}
Rhenium 188 (sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
(insol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
Rhodium 103m (sol.)	0.4	8×10^{-5}	0.1	3×10^{-5}
(insol.)	0.3	6×10^{-5}	0.1	2×10^{-5}
Rhodium 105 (sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
(insol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Rubidium 86	(sol.)	2×10^{-3}	3×10^{-7}	7×10^{-4}	10^{-7}
	(insol.)	7×10^{-4}	7×10^{-8}	2×10^{-4}	2×10^{-8}
Rubidium 87	(sol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	5×10^{-3}	7×10^{-8}	2×10^{-3}	2×10^{-8}
Ruthenium 97	(sol.)	0.01	2×10^{-6}	4×10^{-3}	8×10^{-7}
	(insol.)	0.01	2×10^{-6}	3×10^{-3}	6×10^{-7}
Ruthenium 103	(sol.)	2×10^{-3}	5×10^{-7}	8×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	8×10^{-8}	8×10^{-4}	3×10^{-8}
Ruthenium 105	(sol.)	3×10^{-3}	7×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-7}	10^{-3}	2×10^{-7}
Ruthenium 106	(sol.)	4×10^{-4}	8×10^{-8}	10^{-4}	3×10^{-8}
	(insol.)	3×10^{-4}	6×10^{-9}	10^{-4}	2×10^{-9}
Samarium 147	(sol.)	2×10^{-3}	7×10^{-11}	6×10^{-4}	2×10^{-11}
	(insol.)	2×10^{-3}	3×10^{-10}	7×10^{-4}	9×10^{-11}
Samarium 151	(sol.)	0.01	6×10^{-8}	4×10^{-3}	2×10^{-8}
	(insol.)	0.01	10^{-7}	4×10^{-3}	5×10^{-8}
Samarium 153	(sol.)	2×10^{-3}	5×10^{-7}	8×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	4×10^{-7}	8×10^{-4}	10^{-7}
Scandium 46	(sol.)	10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-8}
	(insol.)	10^{-3}	2×10^{-8}	4×10^{-4}	8×10^{-9}
Scandium 47	(sol.)	3×10^{-3}	6×10^{-7}	9×10^{-4}	2×10^{-7}
	(insol.)	3×10^{-3}	5×10^{-7}	9×10^{-4}	2×10^{-7}
Scandium 48	(sol.)	8×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
	(insol.)	8×10^{-4}	10^{-7}	3×10^{-4}	5×10^{-8}
Selenium 75	(sol.)	9×10^{-3}	10^{-6}	3×10^{-3}	4×10^{-7}
	(insol.)	8×10^{-3}	10^{-7}	3×10^{-3}	4×10^{-8}
Silicon 31	(sol.)	0.03	6×10^{-6}	9×10^{-3}	2×10^{-6}
	(insol.)	6×10^{-3}	10^{-6}	2×10^{-3}	3×10^{-7}
Silver 105	(sol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	8×10^{-8}	10^{-3}	3×10^{-8}
Silver 110m	(sol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	7×10^{-8}
	(insol.)	9×10^{-4}	10^{-8}	3×10^{-4}	3×10^{-9}
Silver 111	(sol.)	10^{-3}	3×10^{-7}	4×10^{-4}	10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-8}
Sodium 22	(sol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
	(insol.)	9×10^{-4}	9×10^{-9}	3×10^{-4}	3×10^{-9}
Sodium 24	(sol.)	6×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
	(insol.)	8×10^{-4}	10^{-7}	3×10^{-4}	5×10^{-8}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Strontium 85m	(sol.)	0.2	4×10^{-5}	0.07	10^{-5}
	(insol.)	0.2	3×10^{-5}	0.07	10^{-5}
Strontium 85	(sol.)	3×10^{-3}	2×10^{-7}	10^{-3}	8×10^{-8}
	(insol.)	5×10^{-3}	10^{-7}	2×10^{-3}	4×10^{-8}
Strontium 89	(sol.)	3×10^{-4}	3×10^{-8}	10^{-4}	10^{-8}
	(insol.)	8×10^{-4}	4×10^{-8}	3×10^{-4}	10^{-8}
Strontium 90	(sol.)	4×10^{-6}	3×10^{-10}	10^{-6}	10^{-10}
	(insol.)	10^{-3}	5×10^{-9}	4×10^{-4}	2×10^{-9}
Strontium 91	(sol.)	2×10^{-3}	4×10^{-7}	7×10^{-4}	2×10^{-7}
	(insol.)	10^{-3}	3×10^{-7}	5×10^{-4}	9×10^{-8}
Strontium 92	(sol.)	2×10^{-3}	4×10^{-7}	7×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}	6×10^{-4}	10^{-7}
Sulfur 35	(sol.)	2×10^{-3}	3×10^{-7}	6×10^{-4}	9×10^{-8}
	(insol.)	8×10^{-3}	3×10^{-7}	3×10^{-3}	9×10^{-8}
Tantalum 182	(sol.)	10^{-3}	4×10^{-8}	4×10^{-4}	10^{-8}
	(insol.)	10^{-3}	2×10^{-8}	4×10^{-4}	7×10^{-9}
Technetium 96m	(sol.)	0.4	8×10^{-5}	0.1	3×10^{-5}
	(insol.)	0.3	3×10^{-5}	0.1	10^{-5}
Technetium 96	(sol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	5×10^{-4}	8×10^{-8}
Technetium 97m	(sol.)	0.01	2×10^{-6}	4×10^{-3}	8×10^{-7}
	(insol.)	5×10^{-3}	2×10^{-7}	2×10^{-3}	5×10^{-8}
Technetium 97	(sol.)	0.05	10^{-5}	0.02	4×10^{-6}
	(insol.)	0.02	3×10^{-7}	8×10^{-3}	10^{-7}
Technetium 99m	(sol.)	0.2	4×10^{-5}	0.06	10^{-5}
	(insol.)	0.08	10^{-5}	0.03	5×10^{-6}
Technetium 99	(sol.)	0.01	2×10^{-6}	3×10^{-3}	7×10^{-7}
	(insol.)	5×10^{-3}	6×10^{-8}	2×10^{-3}	2×10^{-8}
Tellurium 125	(sol.)	5×10^{-3}	4×10^{-7}	2×10^{-3}	10^{-7}
	(insol.)	3×10^{-3}	10^{-7}	10^{-3}	4×10^{-8}
Tellurium 127m	(sol.)	2×10^{-3}	10^{-7}	6×10^{-4}	5×10^{-8}
	(insol.)	2×10^{-3}	4×10^{-8}	5×10^{-4}	10^{-8}
Tellurium 127	(sol.)	8×10^{-3}	2×10^{-6}	3×10^{-3}	6×10^{-7}
	(insol.)	5×10^{-3}	9×10^{-7}	2×10^{-3}	3×10^{-7}
Tellurium 129m	(sol.)	10^{-3}	8×10^{-8}	3×10^{-4}	3×10^{-8}
	(insol.)	6×10^{-4}	3×10^{-8}	2×10^{-4}	10^{-8}
Tellurium 129	(sol.)	0.02	5×10^{-6}	8×10^{-3}	2×10^{-6}
	(insol.)	0.02	4×10^{-6}	8×10^{-3}	10^{-6}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Tellurium 131m	(sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
	(insol.)	10^{-3}	2×10^{-7}	4×10^{-4}	6×10^{-8}
Tellurium 132	(sol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	7×10^{-8}
	(insol.)	6×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
Terbium 160	(sol.)	10^{-3}	10^{-7}	4×10^{-4}	3×10^{-8}
	(insol.)	10^{-3}	3×10^{-8}	4×10^{-4}	10^{-8}
Thallium 200	(sol.)	0.01	3×10^{-6}	4×10^{-3}	9×10^{-7}
	(insol.)	7×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
Thallium 201	(sol.)	9×10^{-3}	2×10^{-6}	3×10^{-3}	7×10^{-7}
	(insol.)	5×10^{-3}	9×10^{-7}	2×10^{-3}	3×10^{-7}
Thallium 202	(sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	2×10^{-3}	2×10^{-7}	7×10^{-4}	8×10^{-8}
Thallium 204	(sol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	2×10^{-3}	3×10^{-8}	6×10^{-4}	9×10^{-9}
Thorium 227	(sol.)	5×10^{-4}	3×10^{-10}	2×10^{-4}	10^{-10}
	(insol.)	5×10^{-4}	2×10^{-10}	2×10^{-4}	6×10^{-11}
Thorium 228	(sol.)	2×10^{-4}	9×10^{-12}	7×10^{-5}	3×10^{-12}
	(insol.)	4×10^{-4}	6×10^{-12}	10^{-4}	2×10^{-12}
Thorium 230	(sol.)	5×10^{-5}	2×10^{-12}	2×10^{-5}	8×10^{-13}
	(insol.)	9×10^{-4}	10^{-11}	3×10^{-4}	3×10^{-12}
Thorium 231	(sol.)	7×10^{-3}	10^{-6}	2×10^{-3}	5×10^{-7}
	(insol.)	7×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}
Thorium 232	(sol.)	5×10^{-5}	2×10^{-12}	2×10^{-5}	7×10^{-13}
	(insol.)	10^{-3}	10^{-11}	4×10^{-4}	4×10^{-12}
Thorium 234	(sol.)	5×10^{-4}	6×10^{-8}	2×10^{-4}	2×10^{-8}
	(insol.)	5×10^{-4}	3×10^{-8}	2×10^{-4}	10^{-8}
Thorium Nat.	(sol.)	3×10^{-5}	2×10^{-12}	10^{-5}	6×10^{-13}
	(insol.)	3×10^{-4}	4×10^{-12}	10^{-4}	10^{-12}
Thulium 170	(sol.)	10^{-3}	4×10^{-8}	5×10^{-4}	10^{-8}
	(insol.)	10^{-3}	3×10^{-8}	5×10^{-4}	10^{-8}
Thulium 171	(sol.)	0.01	10^{-7}	5×10^{-3}	4×10^{-8}
	(insol.)	0.01	2×10^{-7}	5×10^{-3}	8×10^{-8}
Tin 113	(sol.)	2×10^{-3}	4×10^{-7}	9×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	5×10^{-8}	8×10^{-4}	2×10^{-8}
Tin 125	(sol.)	5×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
	(insol.)	5×10^{-4}	8×10^{-8}	2×10^{-4}	3×10^{-8}
Tungsten 181	(sol.)	0.01	2×10^{-6}	4×10^{-3}	8×10^{-7}
	(insol.)	0.01	10^{-7}	3×10^{-3}	4×10^{-8}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
ungsten 185	(sol.)	4×10^{-3}	8×10^{-7}	10^{-3}	3×10^{-7}
	(insol.)	3×10^{-3}	10^{-7}	10^{-3}	4×10^{-8}
ungsten 187	(sol.)	2×10^{-3}	4×10^{-7}	7×10^{-4}	2×10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}	6×10^{-4}	10^{-7}
ranium 230	(sol.)	10^{-4}	3×10^{-10}	5×10^{-5}	10^{-10}
	(insol.)	10^{-4}	10^{-10}	5×10^{-5}	4×10^{-11}
ranium 232	(sol.)	8×10^{-4}	10^{-10}	3×10^{-4}	3×10^{-11}
	(insol.)	8×10^{-4}	3×10^{-11}	3×10^{-4}	9×10^{-12}
ranium 233	(sol.)	9×10^{-4}	5×10^{-10}	3×10^{-4}	2×10^{-10}
	(insol.)	9×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
ranium 234	(sol.)	9×10^{-4}	6×10^{-10}	3×10^{-4}	2×10^{-10}
	(insol.)	9×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
ranium 235	(sol.)	8×10^{-4}	5×10^{-10}	3×10^{-4}	2×10^{-10}
	(insol.)	8×10^{-4}	10^{-10}	3×10^{-4}	4×10^{-11}
ranium 236	(sol.)	10^{-3}	6×10^{-10}	3×10^{-4}	2×10^{-10}
	(insol.)	10^{-3}	10^{-10}	3×10^{-4}	4×10^{-11}
ranium 238	(sol.)	10^{-3}	7×10^{-11}	4×10^{-4}	3×10^{-11}
	(insol.)	10^{-3}	10^{-10}	4×10^{-4}	5×10^{-11}
ranium-Nat.	(sol.)	5×10^{-4}	7×10^{-11}	2×10^{-4}	3×10^{-11}
	(insol.)	5×10^{-4}	6×10^{-11}	2×10^{-4}	2×10^{-11}
nadium 48	(sol.)	9×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
	(insol.)	8×10^{-4}	6×10^{-8}	3×10^{-4}	2×10^{-8}
non 131m	(imm.)	.....	2×10^{-5}	.....	4×10^{-6}
non 133	(imm.)	.....	10^{-5}	.....	3×10^{-6}
non 135	(imm.)	.....	4×10^{-6}	.....	10^{-6}
terbium 175	(sol.)	3×10^{-3}	7×10^{-7}	10^{-3}	2×10^{-7}
	(insol.)	3×10^{-3}	6×10^{-7}	10^{-3}	2×10^{-7}
trium 90	(sol.)	6×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}
	(insol.)	6×10^{-4}	10^{-7}	2×10^{-4}	3×10^{-8}
trium 91m	(sol.)	0.1	2×10^{-5}	0.03	8×10^{-6}
	(insol.)	0.1	2×10^{-5}	0.03	6×10^{-6}
trium 91	(sol.)	8×10^{-4}	4×10^{-8}	3×10^{-4}	10^{-8}
	(insol.)	8×10^{-4}	3×10^{-8}	3×10^{-4}	10^{-8}
trium 92	(sol.)	2×10^{-3}	4×10^{-7}	6×10^{-4}	10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}	6×10^{-4}	10^{-7}
trium 93	(sol.)	8×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}
	(insol.)	8×10^{-4}	10^{-7}	3×10^{-4}	5×10^{-8}

Radionuclide		For 40 Hour Week		For 168 Hour Week	
		Water uc/ml	Air uc/ml	Water uc/ml	Air uc/ml
Column		A	B	C	D
Zinc 65	(sol.)	3x10 ⁻³	10 ⁻⁷	10 ⁻³	4x10 ⁻⁸
	(insol.)	5x10 ⁻³	6x10 ⁻⁸	2x10 ⁻³	2x10 ⁻⁸
Zinc 69m	(sol.)	2x10 ⁻³	4x10 ⁻⁷	7x10 ⁻⁴	10 ⁻⁷
	(insol.)	2x10 ⁻³	3x10 ⁻⁷	6x10 ⁻⁴	10 ⁻⁷
Zinc 69	(sol.)	0.05	7x10 ⁻⁶	0.02	2x10 ⁻⁶
	(insol.)	0.05	9x10 ⁻⁶	0.02	3x10 ⁻⁶
Zirconium 93	(sol.)	0.02	10 ⁻⁷	8x10 ⁻³	4x10 ⁻⁸
	(insol.)	0.02	3x10 ⁻⁷	8x10 ⁻³	10 ⁻⁷
Zirconium 95	(sol.)	2x10 ⁻³	10 ⁻⁷	6x10 ⁻⁴	4x10 ⁻⁸
	(insol.)	2x10 ⁻³	3x10 ⁻⁸	6x10 ⁻⁴	10 ⁻⁸
Zirconium 97	(sol.)	5x10 ⁻⁴	10 ⁻⁷	2x10 ⁻⁴	4x10 ⁻⁸
	(insol.)	5x10 ⁻⁴	9x10 ⁻⁸	2x10 ⁻⁴	3x10 ⁻⁸
Unidentified Radionuclides		.....	.....	10 ⁻⁷	4x10 ⁻¹³

NOTE:

Abbreviations— sol. = soluble
insol. = insoluble
imm. = immersion
m = metastable

SECTION 8 – RADIATION SURVEYS AND PERSONNEL MONITORING

8.1 Surveys inside Controlled Areas

- 8.1.1 Controlled areas shall be surveyed by, or under the direction of, a qualified individual using suitable instruments and methods for measuring radiation, to determine the dose rates to which any individual may be exposed. For protection purposes these measurements shall take into consideration the time the radiation is being produced, the work week and the fraction of the week that any individual may be exposed to the radiation. Subsequent surveys shall be conducted at such times and as frequently as may be necessary to assure that the dose rates have not substantially increased and that they remain in compliance with the magnitudes stipulated in this Code.
- 8.1.2 Surveys shall be made of the air for radioactive content when the average concentrations may exceed one-fourth the amount specified in Section 7.5, Column B, or prorated values when more than one isotope is present. There shall be sufficient monitoring to insure that a contamination hazard does not exist.
- 8.1.3 Installations where unsealed radioactive materials are stored or used shall be periodically surveyed for contamination of surfaces.

These surveys shall be conducted in a manner to detect quantities of materials which are potential ingestion hazards. Although no specific table of maximum permissible activity per unit area is presented, Section 7.5, Column A, may be used as a guide to relative degree of hazard.

Surveys outside Controlled Areas

Surveys shall be made outside controlled areas at sufficient intervals and conditions as may be necessary to insure compliance with Sections 7.2, and 7.3.

Statement in Lieu of Actual Survey

A written statement signed by a qualified individual and including his calculations and analysis of the dose rates in the vicinity of a radiation source may be acceptable in place of the survey required in Section 8.1.1 and Section

Use of Personnel Monitoring Equipment

Appropriate personnel monitoring equipment shall be supplied to and shall be used by:

- (1) Each individual who enters a controlled area under such circumstances that he receives or is likely to receive, a dose in excess of 25 millirems in any period of 7 consecutive days;
- (2) Each individual who enters a high radiation area.

All individuals required to wear personnel monitoring equipment shall be instructed in its proper use and purpose. Records shall be kept in accordance with Section 9.1.

SECTION 9 — RECORDS

Personnel Monitoring Records

- 9.1.1 Records shall be maintained showing the radiation exposures of all individuals who are required to wear personnel monitoring equipment according to Section 8.4.
- 9.1.2 Each individual, on his request, shall be supplied with an annual statement of his radiation exposure record.
- 9.1.3 The exposure records on each employee shall be preserved during the course of his employment and for at least ten years after termination of employment. Exposure records of other persons shall be preserved for at least ten years.
- 9.1.4 These records or true copy of same shall be made available to the Department on request.

Records of Surveys

- 9.2.1 Records shall be maintained showing the results of such surveys as are required pursuant to Section 8.
- 9.2.2 The records of each survey shall be retained for at least ten years.
- 9.2.3 These records or true copy of same shall be made available to the Department on request.

Records of Radioactive Materials

- 9.3.1 An accurate accounting for all radioactive materials shall be main-

tained for a radiation installation. Such records shall show radioactive materials received or produced, the amounts and form of the radioactive materials, and such information as may be necessary to account for the difference between the amount of radioactive material received or produced and the amount on hand.

9.3.2 Such records shall be retained for at least two years after the final disposition of any radioactive material.

9.3.3 These records or true copy of same shall be made available to the Department on request.

9.4 Records from Discontinued Installations

The discontinuance of a radiation installation does not relieve the owner from the responsibility of retaining the records required by this Section. Such owner may, however, request the Department to accept the records. The acceptance of such records by the Department relieves the owner of subsequent responsibility only in respect to their preservation as required by this Code.

SECTION 10 — RADIOACTIVE CONTAMINATION CONTROL

10.1 General Precautions

All work with radioactive materials shall be carried out under such conditions as to minimize the possibility of any radioactive contamination that would result in any individual receiving a radiation dose in excess of those specified in Section 7.

10.2 Personnel and Material Contamination

Where the nature of the work is such that an individual or his clothing may become contaminated to such degree as to present possible hazard, the individual and his clothing shall be suitably monitored. Any contamination which might lead to doses in excess of the values specified in Section 7 shall be removed from the contaminated individual before that individual is permitted to leave the controlled area. No clothing, equipment or other material having contamination which might lead to doses or concentrations in excess of those indicated in Section 7 shall be permitted to leave the controlled area except as radioactive material.

10.3 Sealed Source Testing

Sealed sources emitting alpha particles shall be tested for leakage at intervals of not longer than three months. Other sealed sources, except tritium and krypton, shall be tested for leakage at intervals of not longer than six months. Records of testing shall be kept for at least two years.

10.4 Decontamination of Premises

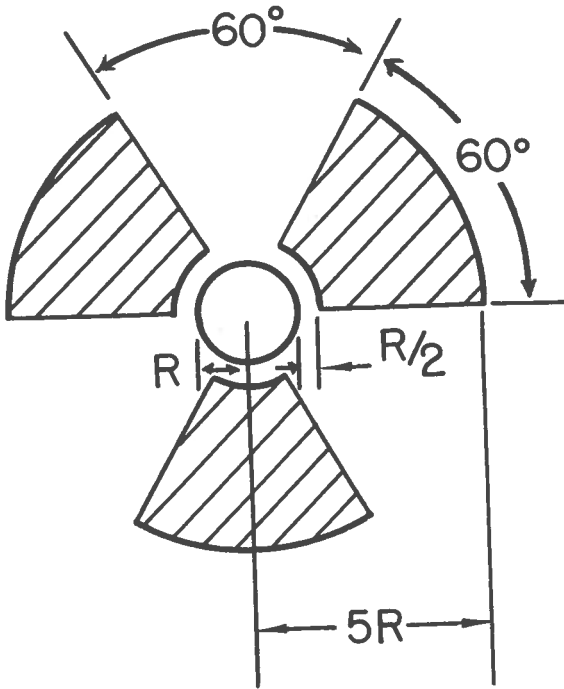
Premises on which radioactive materials have been used shall not be reused until such decontamination as necessary has been effected.

SECTION 11 — LABELING AND POSTING

11.1 General Requirement

11.1.1 All signs and labels required by this Section shall use the conventional radiation caution symbol shaped and colored as follows:

RADIATION CAUTION SYMBOL



1. Cross-hatched area is to be magenta or purple.
2. Required lettering is to be magenta or purple.
3. Background is to be yellow.

11.1.2 In addition to the language prescribed in the various paragraphs of this Section, any supplementary information which might be appropriate in aiding individuals to minimize exposure to radiation or to radioactive materials may be provided on or near such required signs or labels.

1.2 Posting of Radiation Areas

Each Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

**CAUTION
RADIATION AREA**

or

**DANGER
RADIATION AREA**

11.3 Posting of High Radiation Areas

Each High Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

**CAUTION
HIGH RADIATION AREA**

or

**DANGER
HIGH RADIATION AREA**

11.4 Posting of Air-Borne Radioactivity Areas

Each Air-borne Radioactivity Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION or **DANGER**
AIR-BORNE RADIOACTIVITY AREA AIR-BORNE RADIOACTIVITY AREA

11.5 Posting of Areas Containing Radioactive Materials

Each entrance to areas or rooms in which radioactive material is used or stored in an amount greater than 10 times that specifically exempted in Section 4.6 shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION or **DANGER**
RADIOACTIVE MATERIAL(S) RADIOACTIVE MATERIAL(S)

11.6 Labeling of Equipment and Containers

11.6.1 Any equipment or container in which radioactive material is transported, stored, or used, in an amount greater than 10 times that specifically exempted in Section 4.6 shall bear a durable, clearly visible label bearing the radiation caution symbol and the words:

CAUTION or **DANGER**
RADIOACTIVE MATERIAL RADIOACTIVE MATERIAL

11.6.2 Where containers are used for storage, the labels required in this paragraph shall state also the quantities and kinds of radioactive materials in the containers and the date of measurement of the quantities.

11.7 Removal of Signs and Labels

All radiation caution labels which may have been posted at a time when a radiation hazard existed shall be removed when the hazard no longer exists.

11.8 Exceptions from Posting and Labeling Requirements

Notwithstanding the other provisions of this Section, a room, area or container need not be posted or labeled if the following conditions are met:

11.8.1 Radiation Areas and High Radiation Areas which result from the operation of therapeutic X-ray machines operated at potentials of 60 kv. and below or from the operation of diagnostic X-ray machines shall be exempt from the posting requirements of Sections 11.2 and 11.3 provided that the operator of the equipment has taken precautions to insure that no individual other than the patient shall be in the radiation area.

11.8.2 Rooms or other areas in hospitals are not required to be posted with radiation caution signs because of the presence of patients containing radioactive material provided that there are personnel in attendance who shall take the precautions necessary to prevent the exposure of any individual other than the patient to radiation or radioactive material in excess of the limits established in this Code.

11.8.3 A room or area is not required to be posted with a radiation caution sign because of the presence of a sealed source provided the radia-

tion level twelve inches from the surface of the source container or housing does not exceed five millirem per hour.

- 11.8.4 Radiation caution signs are not required to be posted at areas or rooms containing radioactive materials for periods of less than eight hours provided that (1) the materials are constantly attended during such periods by an individual who shall take the precautions necessary to prevent the exposure of any other individual to radiation or radioactive materials in excess of the limits established in these regulations, and (2) such area or room is subject to the user's control.
- 11.8.5 Laboratory containers such as beakers, flasks and test tubes need not be labeled if they are being used transiently in laboratory procedures when the user is present.
- 11.8.6 Radioactive materials packaged and labeled in accordance with regulations of the Interstate Commerce Commission shall be exempt from the labeling and posting requirements of this Section during shipment, provided that the inside containers are labeled in accordance with the provisions of Section 11.6.

SECTION 12 — STORAGE OF RADIOACTIVE MATERIALS

Radioactive materials stored in other than controlled areas shall be secured against unauthorized removal.

SECTION 13 — DISPOSAL OF RADIOACTIVE MATERIALS

13.1 General Requirements

Except as provided in these regulations the disposal of radioactive materials shall be permitted only to the extent and under the conditions authorized by the Department in writing.

13.2 Disposal by Release into Sanitary Sewerage Systems

13.2.1 An owner may discharge radioactive material into a sanitary sewerage system providing:

- (a) It is readily soluble or dispersible in water; and
- (b) The quantity of any radioactive material released into the system by the owner in any one day does not exceed the larger of sub-paragraphs (1) or (2) of this paragraph:
 - (1) The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the owner, will result in an average concentration equal to the limits specified in Section 7.5, Column A, or prorated values if more than one isotope is released; or
 - (2) Ten times the quantity of such material specified in Section 4.6, Column A; and
- (c) The quantity of any radioactive material released in any one month, if diluted by the average monthly quantity of sewage released by the owner, will not result in an average concentration exceeding the limits specified in Section 7.5, Column A, or prorated values if more than one isotope is released; and

- (d) The gross quantity of radioactive material released into the sewerage system by the owner does not exceed one curie per year.

13.2.2 Radioactive wastes excreted by humans shall be exempt from the limitations of Section 13.2.1.

13.3 Disposal by Discharge into the Air

13.3.1 An owner may discharge radioactive material into the air outside of a controlled area providing he can demonstrate that there is no reasonable likelihood that any individual will be exposed to concentrations in excess of one-tenth those specified in Section 7.5, Column D, or prorated values if more than one isotope is discharged. For purposes of this paragraph, concentrations may be averaged over periods not greater than one year.

13.3.2 If several owners are discharging radioactive material into the air in the same environs, they shall, upon being notified of the fact, cooperate in limiting the release and shall file with the Department a statement of their agreed pro-rata releases. If no agreement is reached, the amount of maximum discharge for each owner shall be set by the Department.

13.4 Disposal by Burial in the Soil

13.4.1 No owner shall dispose of radioactive material by burial in the soil without approval in writing from the Department.

13.4.2 Sites that have been used for burial of radioactive materials shall not be converted to other uses except with the written permission of the Department.

13.4.3 The owner of any burial ground shall notify the Department in writing not less than 30 days in advance of any transfer of title to the property involved.

13.5 Disposal by Transfer to a Radioisotope Disposal Service

13.5.1 An owner may dispose of radioactive materials by transfer to a radioisotope disposal service providing this service has been approved by the Department.

13.5.2 An owner may dispose of radioactive materials by transfer to a Federal Agency.

13.6 Disposal by Transfer of Ownership

An owner may dispose of radioactive materials by transfer of title pursuant to the requirements of pertinent law and regulation.

SECTION 14 — TRANSPORTATION

Intrastate transportation of radioactive materials in New Jersey outside the owner's premises shall conform to such regulations of the Interstate Commerce Commission, or the Federal Aviation Agency, or the Post Office Department, or the United States Coast Guard, as may be appropriate concerning labeling, packaging, shielding, or other safety precautions.

SECTION 15 — DISASTER PRECAUTIONS

All owners of radioactive materials shall make a study of radiation hazards which may arise from fires, floods, windstorms and other disasters within and near the installation with regards to:

- Fire fighters
- Emergency workers
- Tenants and employees
- General public

Such studies shall be made for radioactive materials on hand and shall be made in advance of the receipt of additional radioactive materials.

An emergency operation plan shall be prepared from these studies and all persons concerned informed of their duties.

SECTION 16 — REPORTS OF THEFTS AND RADIATION INCIDENTS

1 Reports of Theft or Loss of Radioactive Materials

The Department shall be immediately notified by telephone and telegraph of any theft or loss of radioactive material in such quantities and under such circumstances that a substantial radiation contamination hazard may result.

2 Reportable Radiation Incidents

16.2.1 Immediate Notification

The Department shall be immediately notified by telephone and telegraph of any radiation incident which may have caused or threatens to cause:

- (a) Exposure of any individual to 25 rems or more of radiation including any radioactive material taken into the body; or
- (b) The release of radioactive material in concentrations which, if averaged over a period of 24 hours, would exceed 5000 times the limits specified for such materials in Section 7.5, Columns C and D, or prorated values if more than one isotope is released; or
- (c) A loss of one working week or more of the operation of any facilities affected; or
- (d) Damage to property in excess of \$100,000.

16.2.2 Twenty-four Hour Notification

The Department shall be notified within 24 hours by telephone and telegraph of any radiation incident which may have caused or threatens to cause:

- (a) Exposure of any individual to 5 rems or more of radiation including any radioactive material taken into the body; or
- (b) The release of radioactive material in concentrations which, if averaged over a period of twenty-four hours, would exceed 500 times the limit specified for such materials in Section 7.5, Columns C and D, or prorated values if more than one isotope is released; or
- (c) A loss of one day or more of the operation of any facilities affected; or
- (d) Damage to property in excess of \$1,000.

16.2.3 Written Reports

Incidents reported under Sections 16.2.1 and 16.2.2 must be reported in writing within 30 days. These reports shall describe the nature of the radiation incident, the extent of exposure of individuals to radiation or to radioactive material, the levels of radiation and concentrations of radioactive material involved, the cause of the incident and corrective steps taken or planned to assure against recurrence of the incident.