

**Code of Maryland Regulations 26.12.01.01**  
**REGULATIONS FOR THE CONTROL OF IONIZING RADIATION (1994)**  
**Supplement 8 Effective October 13, 2003**

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**REGULATIONS FOR THE CONTROL OF IONIZING RADIATION (1994)**



RADIOLOGICAL HEALTH PROGRAM  
AIR AND RADIATION MANAGEMENT ADMINISTRATION  
MARYLAND DEPARTMENT OF THE ENVIRONMENT

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**PART A**  
**GENERAL PROVISIONS**

Sec. A.1 Scope. Except as otherwise specifically provided, these regulations apply to all persons who receive, possess, use, transfer, own, or acquire any source of radiation; provided, however, that nothing in these regulations shall apply to any person to the extent such person is subject to regulation by the U.S. Nuclear Regulatory Commission.<sup>1</sup> This part also gives notice to all persons who knowingly provide to any licensee, applicant, certificate of registration holder, contractor, or subcontractor, components, equipment, materials, or other goods or services, that relate to a licensee's, applicant's or certificate of registration holder's activities subject to these regulations, that they may be individually subject to Maryland Department of the Environment enforcement actions for violation of A.16.

Sec. A.2 Definitions. As used in these regulations, these terms have the definitions set forth below. Additional definitions used only in a certain part will be found in that part.

"A1" means the maximum activity of special form radioactive material permitted in a Type A package.

"A2" means the maximum activity of radioactive material, other than special form radioactive material, permitted in a Type A package. These values are either listed in Appendix A of Part T of these regulations, Table I, or may be derived in accordance with the procedure prescribed in Appendix A of Part T of these regulations.

"Absorbed dose" [See "Dose"]

"Accelerator-produced material" means any material made radioactive by a particle accelerator.

"Act" means the Annotated Code of Maryland, Environment Article, Title 8 "Radiation."

"Activity" means the rate of disintegration (or transformation) or decay of radioactive material. The units of activity are the becquerel (Bq) and the curie (Ci).

"Adult" means an individual 18 or more years of age.

"Agency" means the Maryland Department of Environment, Radiological Health Program.

"Agreement State" means any State with which the U.S. Nuclear Regulatory Commission or the U.S. Atomic Energy Commission has entered into an effective agreement under subsection 274b. of the Atomic Energy Act of 1954, as amended (73 Stat. 689).

"Airborne radioactive material" means any radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

"Airborne radioactivity area" means a room, enclosure, or area in which airborne radioactive material exists in concentrations:

(1) In excess of the derived air concentrations (DACs) specified in Appendix B, Table I of Part D of these regulations, or

(2) To such a degree that an individual present in the area without respirator protective equipment

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1/ Attention is directed to the fact that regulation by the State of source material, byproduct material, and special nuclear material in quantities not sufficient to form a critical mass is subject to the provisions of the agreement between the State and the U.S. Nuclear Regulatory Commission and to 10 CFR Part 150 of the Commission's regulations.

could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC hours.

"Annually" means either (1) at intervals not to exceed 1 year or (2) once per year, at about the same time per year (plus or minus 1 month).

"As low as reasonably achievable (ALARA)" means making every reasonable effort to maintain exposures to radiation as far below the dose limits in these regulations as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

"Authorized nuclear pharmacist" means a pharmacist who is:

- (1) Board certified as a nuclear pharmacist by the Board of Pharmaceutical Specialties;
- (2) Identified as an authorized nuclear pharmacist on a license issued by the Agency, the NRC, or any other Agreement State that authorizes the use of radioactive material in the practice of nuclear pharmacy; or
- (3) Identified as an authorized nuclear pharmacist on a permit issued by the Agency, NRC, or any other Agreement State specific licensee of broad scope that is authorized to permit the use of radioactive material in the practice of nuclear pharmacy.

"Background radiation" means radiation from cosmic sources; naturally occurring radioactive materials, including radon, except as a decay product of source or special nuclear material, and including global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include sources of radiation from radioactive materials or radiation producing machines regulated by the Agency.

"Becquerel" (Bq) means the SI unit of activity. One becquerel is equal to 1 disintegration or transformation per second (S-1).

"Bioassay" means the determination of kinds, quantities or concentrations and, in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or by analysis and evaluation of materials excreted or removed from the human body. For purposes of these regulations, "radiobioassay" is an equivalent term.

"Byproduct material" means:

- (1) Any radioactive material, except special nuclear material, yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material; and
- (2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium or thorium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition.

**TABLE 2**  
**MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE**  
**EQUIVALENT FOR MONOENERGETIC NEUTRONS**

	Neutron Energy (MeV)	Quality Factor <sup>a</sup> (Q)	Fluence per unit Dose Equivalent <sup>b</sup> (neutrons cm <sup>-2</sup> rem <sup>-1</sup> )	Fluence per unit Dose Equivalent <sup>b</sup> (neutrons cm <sup>-2</sup> Sv <sup>-1</sup> )
(thermal)	2.5x10 <sup>-8</sup>	2	980x10 <sup>6</sup>	980x10 <sup>8</sup>
	1x10 <sup>-7</sup>	2	980x10 <sup>6</sup>	980x10 <sup>8</sup>
	1x10 <sup>-6</sup>	2	810x10 <sup>6</sup>	810x10 <sup>8</sup>
	1x10 <sup>-5</sup>	2	810x10 <sup>6</sup>	810x10 <sup>8</sup>
	1x10 <sup>-4</sup>	2	840x10 <sup>6</sup>	840x10 <sup>8</sup>
	1x10 <sup>-3</sup>	2	980x10 <sup>6</sup>	980x10 <sup>8</sup>
	1x10 <sup>-2</sup>	2.5	1010x10 <sup>6</sup>	1010x10 <sup>8</sup>
	1x10 <sup>-1</sup>	7.5	170x10 <sup>6</sup>	170x10 <sup>8</sup>
	5x10 <sup>-1</sup>	11	39x10 <sup>6</sup>	39x10 <sup>8</sup>
	1	11	27x10 <sup>6</sup>	27x10 <sup>8</sup>
	2.5	9	29x10 <sup>6</sup>	29x10 <sup>8</sup>
	5	8	23x10 <sup>6</sup>	23x10 <sup>8</sup>
	7	7	24x10 <sup>6</sup>	24x10 <sup>8</sup>
	10	6.5	24x10 <sup>6</sup>	24x10 <sup>8</sup>
	14	7.5	17x10 <sup>6</sup>	17x10 <sup>8</sup>
	20	8	16x10 <sup>6</sup>	16x10 <sup>8</sup>
	40	7	14x10 <sup>6</sup>	14x10 <sup>8</sup>
	60	5.5	16x10 <sup>6</sup>	16x10 <sup>8</sup>
	1x10 <sup>2</sup>	4	20x10 <sup>6</sup>	20x10 <sup>8</sup>
	2x10 <sup>2</sup>	3.5	19x10 <sup>6</sup>	19x10 <sup>8</sup>
	3x10 <sup>2</sup>	3.5	16x10 <sup>6</sup>	16x10 <sup>8</sup>
	4x10 <sup>2</sup>	3.5	14x10 <sup>6</sup>	14x10 <sup>8</sup>

<sup>a</sup>Value of quality factor (Q) at the point where the dose equivalent is maximum in a 30-centimeter diameter cylinder tissue-equivalent phantom.

<sup>b</sup>Monoenergetic neutrons incident normally on a 30-centimeter diameter cylinder tissue-equivalent phantom.

Sec. A.14 Units of Radioactivity. For purposes of these regulations, activity is expressed in the SI unit of becquerel (Bq) or in the special unit of curie (Ci), or their multiples, or disintegrations or transformations per unit of time.

- (a) One becquerel (Bq) = 1 disintegration or transformation per second ( $s^{-1}$ ) (dps or tps).
- (b) One curie (Ci) =  $3.7 \times 10^{10}$  disintegrations or transformations per second =  $3.7 \times 10^{10}$  becquerel (Bq) =  $2.22 \times 10^{12}$  disintegrations or transformations per minute.

Sec. A.15 False Statements, Representations and Certifications.

No person shall:

- (a) make a false statement, representation, or certification in any application, record, report, plan or other document regarding radiation levels, tests performed, radiation safety conditions, practices or notices, or
- (b) falsify, tamper with or render inaccurate any monitoring device or method for data collection if the data collected by that device or method is required by these regulations, or by any license or registration condition.

Sec A.16 Deliberate Misconduct.

(a) Any licensee, certificate of registration holder, applicant for a license or certificate of registration, employee of a licensee, certificate of registration holder or applicant; or any contractor (including a supplier or consultant), subcontractor, employee of a contractor or subcontractor of any licensee or certificate of registration holder or applicant for a license or certificate of registration, who knowingly provides to any licensee, applicant, certificate holder, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a licensee's, certificate holder's or applicant's activities in this part, may not:

(1) Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee, certificate of registration holder, or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation of any license issued by the Department; or

(2) Deliberately submit to the Department, a licensee, certificate of registration holder, an applicant, or a licensee's, certificate holder's or applicant's, contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the Department.

(b) A person who violates paragraph (a)(1) or (a)(2) of this section may be subject to enforcement action in accordance with Maryland Environmental Article, Sections 1-301, 8-101, 8-509(b) and 8-510(b).

(c) For the purposes of paragraph (a)(1) of this section, deliberate misconduct by a person means an intentional act or omission that the person knows:

(1) Would cause a licensee, certificate of registration holder or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation, of any license issued by the Department; or

(2) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, certificate of registration holder, applicant, contractor, or subcontractor.

## PART C

### LICENSING OF RADIOACTIVE MATERIAL

#### Sec. C.1 Purpose and Scope.

(a) This part, and Parts G and T, of these regulations, provide for the licensing of radioactive material. No person shall receive, possess, use, transfer, own, or acquire radioactive material except as authorized pursuant to this part or Parts G or T, of these regulations, or as otherwise provided in these parts.

(b) In addition to the requirements of this part, all licensees are subject to the requirements of Parts A, D, J, and T of these regulations. Furthermore, licensees engaged in industrial radiographic operations are subject to the requirements of Part E of these regulations. Licensees using radionuclides in the healing arts are subject to the requirements of Part G of these regulations, and licensees engaged in wireline and subsurface tracer studies are subject to the requirements of Part W of these regulations.

#### Sec. C.2 Definitions.

“Offshore waters” means that area of land and water, beyond Agreement States’ Submerged Lands Act jurisdiction, on or above the U.S. Outer Continental Shelf.

“Principal activities” as used in this part, means activities authorized by the license, which are essential to achieving the purpose(s) for which the license was issued or amended. Storage during which no licensed material is accessed for use or disposal and activities incidental to decontamination or decommissioning are not principal activities.

### Exemptions from the Regulatory Requirements

#### Sec. C.3 Source Material.

(a) Any person is exempt from this part to the extent that such person receives, possesses, uses, owns, or transfers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than 1/20 of 1 percent (0.05 percent) of the mixture, compound, solution, or alloy.

(b) Any person is exempt from this part to the extent that such person receives, possesses, uses, or transfers unrefined and unprocessed ore containing source material; provided that, except as authorized in a specific license, such person shall not refine or process such ore.

(c) Any person is exempt from this part to the extent that such person receives, possesses, uses, or transfers:

- (1) any quantities of thorium contained in
  - (i) incandescent gas mantles,
  - (ii) vacuum tubes,
  - (iii) welding rods,

- (iv) electric lamps for illuminating purposes provided that each lamp does not contain more than 50 milligrams of thorium,
  - (v) germicidal lamps, sunlamps, and lamps for outdoor or industrial lighting provided that each lamp does not contain more than 2 grams of thorium,
  - (vi) rare earth metals and compounds, mixtures, and products containing not more than 0.25 percent by weight thorium, uranium, or any combination of these, or
  - (vii) personnel neutron dosimeters, provided that each dosimeter does not contain more than 50 milligrams of thorium;
- (2) source material contained in the following products:
- (i) glazed ceramic tableware, provided that the glaze contains not more than 20 percent by weight source material,
  - (ii) glassware containing not more than 10 percent by weight source material, but not including commercially manufactured glass brick, pane glass, ceramic tile, or other glass or ceramic used in construction,
  - (iii) glass enamel or glass enamel frit containing not more than 10 percent by weight source material imported or ordered for importation into the United States, or initially distributed by manufacturers in the United States, before July 25, 1983, or
  - (iv) piezoelectric ceramic containing not more than 2 percent by weight source material;
- (3) photographic film, negatives, and prints containing uranium or thorium;
- (4) any finished product or part fabricated of, or containing, tungsten-thorium or magnesium-thorium alloys, provided that the thorium content of the alloy does not exceed 4 percent by weight and that this exemption shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any such product or part;
- (5) uranium contained in counterweights installed in aircraft, rockets, projectiles, and missiles, or stored or handled in connection with installation or removal of such counterweights, provided that
- (i) the counterweights are manufactured in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, authorizing distribution by the licensee pursuant to 10 CFR Part 40,

(viii) Ionizing radiation measuring instruments containing, for purposes of internal calibration or standardization, one or more sources of radioactive material, provided that:

(a) Each source contains no more than one exempt quantity set forth in Appendix B of this part, and

(b) Each instrument contains no more than 10 exempt quantities. For purposes of this requirement, an instrument's source(s) may contain either one or different types of radionuclides and an individual exempt quantity may be composed of fractional parts of one or more of the exempt quantities in Appendix B of this part, provided that the sum of such fractions shall not exceed unity.

(c) For americium-241, 0.05 microcurie (1.85 kBq) is considered an exempt quantity under C.4(c)(1)(viii).

(ix) Spark gap irradiators containing not more than 1 microcurie (37 kBq) of cobalt-60 per spark gap irradiator for use in electrically ignited fuel oil burners having a firing rate of at least 3 gallons (11.4 l) per hour.

(2) Self-Luminous Products Containing Radioactive Material.

(i) Tritium, Krypton-85, or Promethium-147. Except for persons who manufacture, process, or produce self-luminous products containing tritium, krypton-85, or promethium-147, any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns, or acquires tritium, krypton-85 or promethium-147 in self-luminous products manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to Section 32.22 of 10 CFR Part 32, which license authorizes the transfer of the product to persons who are exempt from regulatory requirements. The exemption in C.4(c)(2) does not apply to tritium, krypton-85, or promethium-147 used in products primarily for frivolous purposes or in toys or adornments.

(ii) Radium-226. Any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, or owns articles containing less than 0.1 microcurie (3.7 kBq) of radium-226 which were acquired prior to December 6, 1982.

(3) Gas and Aerosol Detectors Containing Radioactive Material.

(i) Except for persons who manufacture, process, or produce gas and aerosol detectors containing radioactive material, any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns, or acquires radioactive material in gas and aerosol detectors designed to protect life

or property from fires and airborne hazards provided that detectors containing radioactive material shall have been manufactured, imported, or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission <sup>2/</sup> pursuant to Section 32.26 of 10 CFR Part 32; or a Licensing State pursuant to C.28(c), which authorizes the transfer of the detectors to persons who are exempt from regulatory requirements.

(ii) Gas and aerosol detectors previously manufactured and distributed to general licensees in accordance with a specific license issued by an Agreement State shall be considered exempt under C.4(c)(3)(i), provided that the device is labeled in accordance with the specific license authorizing distribution of the generally licensed device, and provided further that they meet the requirements of C.28(c).

(iii) Gas and aerosol detectors containing NARM previously manufactured and distributed in accordance with a specific license issued by a Licensing State shall be considered exempt under C.4(c)(3)(i), provided that the device is labeled in accordance with the specific license authorizing distribution, and provided further that they meet the requirements of C.28(c).

(4) Resins Containing Scandium-46 and Designed for Sand Consolidation in Oil Wells. Any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns or acquires synthetic plastic resins containing scandium-46 which are designed for sand consolidation in oil wells. Such resins shall have been manufactured or imported in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, or shall have been manufactured in accordance with the specifications contained in a specific license issued by the Agency or any Agreement State to the manufacturer of such resins pursuant to licensing requirements equivalent to those in Sections 32.16 and 32.17 of 10 CFR Part 32 of the regulations of the U.S. Nuclear Regulatory Commission. This exemption does not authorize the manufacture of any resins containing scandium-46.

(5) Radioactive Drug: Capsules Containing Carbon-14 Urea for "In vivo" Diagnostic Use for Humans.

(i) Except as provided in paragraphs (b) and (c) of this section, any person is exempt from the requirements for a license and from these regulations provided that such person receives, possesses, uses, transfers, owns, or acquires capsules containing 37 kBq (1 Ci) carbon-14 urea (allowing for nominal variation that may occur during the manufacturing process) each, for "in vivo" diagnostic use for humans.

(ii) Any person who desires to use the capsules for research involving human subjects shall apply for and receive a specific license pursuant to Section C.

(iii) Any person who desires to manufacture, prepare, process, produce, package, repackage, or transfer for commercial distribution such capsules shall apply for and receive a specific license pursuant to 10 CFR §32.21.

(iv) Nothing in this section relieves persons from complying with applicable FDA, Federal, and State requirements governing receipt, administration, and use of drugs.

Sec. C.5 - C.19 Reserved.

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<sup>2/</sup> Authority to transfer possession or control by the manufacturer, processor or producer of any equipment, device, commodity, or other product containing byproduct material whose subsequent possession, use, transfer, and disposal by all other persons are exempted from regulatory requirements may be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

registration certificate number, issuing agency, and expiration date; provided, that the oral certification is confirmed in writing within 10 days.

(4) The transferor may obtain other information compiled by a reporting service from official records of the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State regarding the identity of licensees and the scope and expiration dates of licenses and registration.

(5) When none of the methods of verification described in C.40(d)(1) through (4) are readily available or when a transferor desires to verify that information received by one of such methods is correct or up-to-date, the transferor may obtain and record confirmation from the Agency, the U.S. Nuclear Regulatory Commission, or an Agreement State, or a Licensing State that the transferee is licensed to receive the radioactive material.

(e) Shipment and transport of radioactive material shall be in accordance with the provisions of Part T of these regulations.

Sec. C.41 - C.49 Reserved.

### **Modification and Revocation of Licenses**

Sec. C.50 Modification and Revocation of Licenses.

(a) The terms and conditions of all licenses shall be subject to amendment, revision, or modification or the license may be suspended or revoked by reason of amendments to the Act, or by reason of rules, regulations, and orders issued by the Agency.

(b) Any license may be revoked, suspended, or modified, in whole or in part, for any material false statement in the application or any statement of fact required under provisions of the Act, or because of conditions revealed by such application or statement of fact or any report, record, or inspection or other means which would warrant the Agency to refuse to grant a license on an original application, or for violation of, or failure to observe any of the terms and conditions of the Act, or of the license, or of any rule, regulation, or order of the Agency.

(c) Except in cases of willfulness or those in which the public health, interest or safety requires otherwise, no license shall be modified, suspended, or revoked unless, prior to the institution of proceedings therefor, facts or conduct which may warrant such action shall have been called to the attention of the licensee in writing and the licensee shall have been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements.

(d) Each specific license revoked by the Agency expires at the end of the day on the date of the Agency's final determination to revoke the license, or on the expiration date stated in the determination, or as otherwise provided by Agency order.

Sec. C.51 - C.89 Reserved.

## RECIPROCITY

### Sec. C.90 Reciprocal Recognition of Licenses.

#### (a) Licenses of Byproduct, Source, and Special Nuclear Material in Quantities Not Sufficient to Form a Critical Mass.

(1) Subject to these regulations, any person who holds a specific license from the U.S. Nuclear Regulatory Commission or an Agreement State, and issued by the agency having jurisdiction where the licensee maintains an office for directing the licensed activity and at which radiation safety records are normally maintained, is hereby granted a general license within this state, excluding offshore waters and areas of exclusive Federal jurisdiction, for a period not in excess of 180 days in any calendar year to possess radioactive material and/or to conduct the activities authorized in such licensing document provided that:

(i) the licensing document does not limit the activity authorized by such document to specified installations or locations;

(ii) the out-of-state licensee notifies the Agency in writing at least 3 days prior to engaging in such activity. Such notification shall indicate the location, period, and type of proposed possession and use within the State, and shall be accompanied by a copy of the pertinent licensing document. If, for a specific case, the 3 day period would impose an undue hardship on the out-of-state licensee, the licensee may, upon application to the Agency, obtain permission to proceed sooner. The Agency may waive the requirement for filing additional written notifications during the remainder of the calendar year following the receipt of the initial notification from a person engaging in activities under the general license provided in C.90(a)(1);

(iii) the out-of-state licensee complies with all applicable regulations of the Agency and with all the terms and conditions of the licensing document, except any such terms and conditions which may be inconsistent with applicable regulations of the Agency;

(iv) the out-of-state licensee supplies such other information as the Agency may request; and

(v) the out-of-state licensee shall not transfer or dispose of radioactive material possessed or used under the general license provided in C.90(a)(1) except by transfer to a person:

(a) specifically licensed by the Agency or by the U.S. Nuclear Regulatory Commission to receive such material, or

(b) exempt from the requirements for a license for such material under C.4(a).

(2) Notwithstanding the provisions of C.90(a)(1), any person who holds a specific license issued by the U.S. Nuclear Regulatory Commission or an

this label is prohibited"; and

(iv) The holder of the specific license shall furnish to each general licensee to whom he transfers such device or on whose premises he installs such device a copy of the general license contained in C.22(d) or in equivalent regulations of the agency having jurisdiction over the manufacture and distribution of the device.

(3) The Agency may withdraw, limit, or qualify its acceptance of any specific license or equivalent licensing document issued by a Licensing State, or any product distributed pursuant to such licensing document, upon determining that such action is necessary in order to prevent undue hazard to public health and safety or property.

(c) Reciprocity of Maryland Licensees.

Prior to a State of Maryland company conducting licensed activities in offshore waters or areas of exclusive Federal jurisdiction that company shall meet all pertinent requirements of 10 CFR 150.20.

Part C

APPENDIX A  
EXEMPT CONCENTRATIONS

Element (atomic number)	Radionuclide	Column I	Column II
		Gas concentration μCi/ml <u>1/</u>	Liquid and solid concentration μCi/ml <u>2/</u>
Antimony (51)	Sb-122		3X10 <sup>-4</sup>
	Sb-124		2X10 <sup>-4</sup>
	Sb-125		1X10 <sup>-3</sup>
Argon (18)	Ar-37	1X10 <sup>-3</sup>	
	Ar-41	4X10 <sup>-7</sup>	
Arsenic (33)	As-73		5X10 <sup>-3</sup>
	As-74		5X10 <sup>-4</sup>
	As-76		2X10 <sup>-4</sup>
	As-77		8X10 <sup>-4</sup>
Barium (56)	Ba-131		2X10 <sup>-3</sup>
	Ba-140		3X10 <sup>-4</sup>
Beryllium (4)	Be-7		2X10 <sup>-2</sup>
Bismuth (83)	Bi-206		4X10 <sup>-4</sup>
Bromine (35)	Br-82	4X10 <sup>-7</sup>	3X10 <sup>-3</sup>
Cadmium (48)	Cd-109		2X10 <sup>-3</sup>
	Cd-115m		3X10 <sup>-4</sup>
	Cd-115		3X10 <sup>-4</sup>
Calcium (20)	Ca-45		9X10 <sup>-5</sup>
	Ca-47		5X10 <sup>-4</sup>
Carbon (6)	C-14	1X10 <sup>-6</sup>	8X10 <sup>-3</sup>
Cerium (58)	Ce-141		9X10 <sup>-4</sup>
	Ce-143		4X10 <sup>-4</sup>
	Ce-144		1X10 <sup>-4</sup>
Cesium (55)	Cs-131		2X10 <sup>-2</sup>
	Cs-134m		6X10 <sup>-2</sup>
	Cs-134		9X10 <sup>-5</sup>
Chlorine (17)	Cl-38	9X10 <sup>-7</sup>	4X10 <sup>-3</sup>
Chromium (24)	Cr-51		2X10 <sup>-2</sup>
Cobalt (27)	Co-57		5X10 <sup>-3</sup>
	Co-58		1X10 <sup>-3</sup>
	Co-60		5X10 <sup>-4</sup>

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1/ Values are given in Column I only for those materials normally used as gases.

2/ μCi/g for solids.

"Stochastic effect" means a health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects. For purposes of these regulations, "probabilistic effect" is an equivalent term.

Sec. D.4 Implementation.

- a. Any existing license or registration condition that is more restrictive than Part D remains in force until there is an amendment or renewal of the license or registration.
- b. If a license or registration condition exempts a licensee or registrant from a provision of Part D in effect on or before October 9, 1995, it also exempts the licensee or registrant from the corresponding provision of Part D.
- c. If a license or registration condition cites provisions of Part D in effect prior to October 9, 1995, which do not correspond to any provisions of Part D, the license or registration condition remains in force until there is an amendment or renewal of the license or registration that modifies or removes this condition.

**RADIATION PROTECTION PROGRAMS**

Sec. D.101 Radiation Protection Programs.

- a. In addition to complying with all other provisions of these regulations, a licensee or registrant shall use all means to maintain radiation exposures and releases of radioactive material as low as is reasonably achievable (ALARA).
- b. Each person licensed to receive, use, transfer, own, or acquire radioactive material under Part C of these regulations shall develop, document, and implement a radiation protection program sufficient to ensure compliance with the provisions of these regulations.
- c. The licensee shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation.
- d. To implement the ALARA requirements of D.101(a), and notwithstanding the requirements in D.301 of this part, a constraint on air emissions of radioactive material to the environment, excluding Radon-222 and its daughters, shall be established by licensees such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 mRem (0.1 mSv) per year from these emissions. If a licensee subject to this requirement exceeds this dose constraint, the licensee shall report the exceedence as provided in D.1203 and promptly take appropriate corrective action to ensure against recurrence.

**OCCUPATIONAL DOSE LIMITS**

Sec. D.201 Occupational Dose Limits for Adults.

- a. The licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures pursuant to D.206, to the following dose limits:
  - i. An annual limit, which is the more limiting of:

- i. An individual to receive, in a period of 24 hours:
  - (1) A total effective dose equivalent exceeding 0.05 Sv (5 rem); or
  - (2) An eye dose equivalent exceeding 0.15 Sv (15 rem); or
  - (3) A shallow dose equivalent to the skin or extremities exceeding 0.5 Sv (50 rem); or
- ii. The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.
- c. The licensee or registrant shall prepare each report filed with the Agency pursuant to D.1202 so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.
- d. The provisions of D.1202 do not apply to doses that result from planned special exposures, provided such doses are within the limits for planned special exposures and are reported pursuant to D.206a and D.1204.

Sec. D.1203 Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Constraints or Limits.

- a. Reportable Events. In addition to the notification required by D.1202, each licensee or registrant shall submit a written report to the Agency within 30 days after learning of any of the following occurrences:
  - i. Incidents for which notification is required by D.1202; or
  - ii. Doses in excess of any of the following:
    - (1) The occupational dose limits for adults in D.201; or
    - (2) The occupational dose limits for a minor in D.207; or
    - (3) The limits for an embryo/fetus of a declared pregnant woman in D.208; or
    - (4) The limits for an individual member of the public in D.301; or
    - (5) Any applicable limit in the license or registration; or
    - (6) The ALARA constraints for air emissions established under D.101(d); or
  - iii. Levels of radiation or concentrations of radioactive material in a restricted or unrestricted area in excess of the applicable limits set

forth in any license or registration condition.

b. Contents of Reports.

- i. Each report required by D.1203a. shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:
  - (1) Estimates of each individual's dose; and
  - (2) The levels of radiation and concentrations of radioactive material involved; and
  - (3) The cause of the elevated exposures, dose rates, or concentrations; and
  - (4) Corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license conditions.
- ii. Each report filed pursuant to D.1203a. shall include for each individual exposed: the name, Social Security account number, and date of birth. With respect to the limit for the embryo/fetus in D.208, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

Sec. D.1204 Reports of Planned Special Exposures.

The licensee or registrant shall submit a written report to the Agency within 30 days following any planned special exposure conducted in accordance with D.206, informing the Agency that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by Sec. D.1106.

Sec D.1205 Reports to Individuals of Exceeding Dose Limits.

When a licensee or registrant is required pursuant to D.1203 to report to the Agency any exposure of an identified occupationally exposed individual, or an identified member of the public, to radiation or radioactive material, the licensee or registrant shall also provide a copy of the report submitted to the Agency to the individual. This report shall be transmitted at a time not later than the transmittal to the Agency, and shall comply with the provisions of J.13a. of these regulations.

Sec. D.1206 Reports of Leaking or Contaminated Sealed Sources.