



THE CITY OF NEW YORK

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Michael R. Bloomberg
Mayor

Thomas R. Frieden, m.d., m.p.h.
Commissioner

nyc.gov/health

June 19, 2008

James Luehman, Deputy Director
Division of Material Safety and State Agreements
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Luehman:

Enclosed is a copy of proposed revisions to Article 175 of the New York City Health Code "Radiation Control". The revisions will be made available for public comment. They are expected to be officially adopted by the Board of Health in June, 2008. The changes to the New York City Health Code are identified by underlined additions/square-bracketed [deletions] text and correspond to the following equivalent amendments to NRC regulations.

<u>Rats ID</u>	<u>Title</u>	<u>FR Notice</u>
• 2003-1	Financial Assurance for Materials Licensees	68 FR 57327
• 2004-1	Compatibility With IAEA Transportation Safety Standards (TS-R-1) and Other Transportation Safety Amendments	69 FR 3697
• 2007-4	Order Imposing Fingerprinting Requirements and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material NRC Order EA-07-305	72 FR 70901

We believe that adoption of these revisions satisfies the compatibility and health and safety categories established in the Office of Federal and State Materials and Environmental (FSME) Programs Procedure SA-200 for these amendments.

*Office of Radiological Health
2 Lafayette Street, 11th Floor CN-60
New York, N.Y. 10013*

If you have any questions or comments, please contact either Tobias A. Lickerman, Chief of Radioactive Materials Division, at 212-676-1570, or myself at 212-676-1556

Sincerely,

A handwritten signature in black ink, appearing to read "Gene Miskin". The signature is fluid and cursive, with a prominent initial "G" and a long, sweeping underline.

Gene Miskin
Director
Office of Radiological Health
gmiskin@health.nyc.gov

Attachments

Article 175 MARKUP SECTIONS
RATS ID 2003-1 Financial Assurance for Materials Licensees

RATS ID 2003-1 Financial Assurance for Materials Licensees –
10 CFR Parts 30, 40, and 70

Additions indicated by underlined [deletions indicated by bracketed] text

§175.101 **General requirements for radioactive materials licenses.**

...

§175.101(n) *Financial assurance and recordkeeping for decommissioning.*

§175.101(n)(1)(a) Each applicant for a specific license authorizing the possession and use of unsealed radioactive material of half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities set forth in Appendix B to this section shall submit a decommissioning funding plan as described in §175.101(n)(5). The decommissioning funding plan must also be submitted when a combination of isotopes is involved if R divided by 10^5 is greater than one (1) (unity rule), where R is defined here as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to this section.

§175.101(n)(1)(b) Each holder of, or applicant for, any specific license authorizing the possession and use of sealed sources or plated foils of half-life greater than 120 days and in quantities exceeding 10^{12} times the applicable quantities set forth in Appendix B to this section shall submit a decommissioning funding plan as described in §175.101(n)(5). The decommissioning funding plan must also be submitted when a combination of isotopes is involved [of] if R , as defined in §175.101(n)(1)(a), divided by 10^{12} is greater than one (1) (unity rule)], where R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B]. The decommissioning funding plan must be submitted to the Department by December 2, 2005.

§175.101(n)(2) Each applicant for a specific license authorizing possession and use of radioactive material of half-life greater than 120 days and in quantities specified in §175.101(n)(4) shall either:

§175.101(n)(2)(i) submit a decommissioning funding plan as described in §175.101(n)(4); or

Article 175 MARKUP SECTIONS
RATS ID 2003-1 Financial Assurance for Materials Licensees

§175.101(n)(2)(ii) submit a certification that financial assurance for decommissioning has been provided in the amount prescribed by §175.101(n)(4) using one of the methods described in §175.101(n)(6). For an applicant, this certification may state that the appropriate assurance will be obtained after the application has been approved and the license issued[,] but [prior to]before the receipt of licensed material. If the applicant defers execution of the financial instrument until after the license has been issued, a signed original of the financial instrument obtained to satisfy the requirements of paragraph §175.101(n)(6) of this section must be submitted to the Department prior to receipt of licensed material. If the applicant does not defer execution of the financial instrument, the applicant shall submit to the Department [As] as part of the certification, a [copy] signed original of the financial instrument obtained to satisfy the requirements of paragraph §175.101(n)(6) of this section. [is to be submitted to the Department.]

§175.101(n)(3)(i) Each holder of a specific license issued on or after [August 1, 1994]July 27, 1990, which is of a type described in §175.101(n)(1) or (2), shall provide financial assurance for decommissioning in accordance with the criteria set forth [herein] in this section.

§175.101(n)(3)(ii) Each holder of a specific license issued before [August 1, 1994]July 27, 1990, and of a type described in §175.101(n)(1) shall submit[, by January 1, 1995,] a decommissioning funding plan as described in §175.101(n)(5) or a certification of financial assurance for decommissioning in an amount at least equal to [~~\$750,000~~]\$1,125,000 in accordance with the criteria set forth [herein]in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan [at this time], the licensee shall include a decommissioning funding plan in any application for license renewal. Licensees required to submit the \$1,125,000 amount must do so by December 2, 2004.

§175.101(n)(3)(iii) Each holder of a specific license issued before [August 1, 1994]July 27, 1990, and of a type described in §175.101(n)(2), shall submit, by January 1, 1995, a certification of financial assurance for decommissioning or a decommissioning funding plan in accordance with the criteria set forth herein.

Article 175 MARKUP SECTIONS
RATS ID 2003-1 Financial Assurance for Materials Licensees

§175.101(n)(3)(iv) Each holder of a specific license issued before July 27, 1990, and of a type described in §175.101(n)(1) or §175.101(n)(2) shall submit a decommissioning funding plan as described in §175.101(n)(5) or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.

§175.101(n)(4) Table of required amounts of financial assurance for decommissioning by quantity of material. Licensees required to submit the \$1,125,000 amount must do so by December 2, 2004. Licensees required to submit the the \$113,000 or \$225,000 amount must do so by June 2, 2005. Licensees having possession limits exceeding the upper bounds of this table must base financial assurance on a decommissioning funding plan.

§175.101(n)(4)(i) Greater than 10^4 but less than or equal to 10^5 times the applicable quantities of Appendix B to this section in unsealed form (for a combination of isotopes, if R, as defined in §175.101(n)(1)(a) [herein], divided by 10^4 is greater than 1, but R divided by 10^5 is less than or equal to 1)—[\$750,000] \$1,125,000.

§175.101(n)(4)(ii) Greater than 10^3 but less than or equal to 10^4 times the applicable quantities of Appendix B to this section in unsealed form (for a combination of isotopes, if R, as defined in §175.101(n)(1)(a) [herein], divided by 10^3 is greater than 1, but R divided by 10^4 is less than or equal to 1)—[\$150,000] \$225,000.

§175.101(n)(4)(iii) Greater than 10^{10} but less than or equal to 10^{12} times the applicable quantities of Appendix B to this section in sealed sources or plated foils (for a combination of isotopes, if R, as defined in §175.101(n)(1)(a) [herein], divided by 10^{10} is greater than 1, but R divided by 10^{12} is less than or equal to 1)—[\$75,000] \$113,000.

NO CHANGES TO CODE BEYOND THIS POINT, MAY 2008.
RATS ID 2003-1 Financial Assurance for Materials Licensees
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(k) *Conditions of specific licenses.* (1) Each of the following is hereby made a condition of each specific license:

(2) The Department may at any time set forth in any license or incorporate by reference therein, additional conditions, restrictions or requirements applicable to the licensee's receipt, production, possession, use or transfer of radioactive material covered by such license in order to protect the public health and safety and to minimize danger to life and property from radiation hazards.

§175.101(k)(3) All licensees subject to the criteria to implement Increased Controls pursuant to the U.S. Nuclear Regulatory Commission (NRC) Order EA 05-090, 70 FR 72128, dated December 1, 2005, shall have as part of their Increased Control Program, a Fingerprinting and Criminal History Records Check procedure established for all individuals whom the licensee wishes to allow unescorted access to radioactive material quantities of concern. Such Fingerprinting and Criminal History Records Check procedures shall adhere to the requirements in NRC Order EA-07-305, 72 FR 70901, or any successor order, law or regulation. The requirements of this provision shall apply to all affected licensees upon its effective date.”

(1) *Transfer of radioactive materials.* (1) No licensee shall transfer radioactive material except as authorized pursuant to this subsection.

§175.105 Transportation and Packaging of Radioactive Materials

(a) General provisions.

(1) Purpose and scope.

(i) This section establishes requirements for packaging, preparation for shipment, and transportation of licensed material. The packaging and transport of licensed material are also subject to other sections of this Code (e.g., §§175.03, 175.101) and to the regulations of other agencies (e.g., the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Transportation (USDOT) and the U.S. Postal Service) having jurisdiction over means of transport and other applicable state and local laws and regulations. The requirements of this section are in addition to, and not in substitution for, other requirements.

(ii) This section applies to any licensee authorized by specific or general license issued by the Department to receive, possess, use, or transfer licensed material, if the licensee delivers that material to a carrier for transport, transports the material outside the site of usage as specified in the Department license, or transports that material on public highways. No provision of this section authorizes possession of licensed material. (iii)

The requirements of this section apply to any person who has a license or who is required to obtain a license pursuant to this Code, if the person delivers radioactive material to a carrier for transport or transports the material outside the confines of the person's facility or other authorized place of use.

(2) Records. Each record required by this section must be legible throughout the retention period specified by this Code. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records such as letters, drawings, specifications must include all pertinent information such as stamps, initials and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(3) Completeness and accuracy of information.

(i) Information provided to the Department by an applicant for a license, or by a licensee, or information required by applicable laws or regulations, or licensed conditions to be maintained by the applicant or the licensee must be complete and accurate in all material respects.

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(ii) Each applicant or licensee shall notify the Department of information identified by the applicant or licensee as having, for the regulated activity, a significant implication for public health and safety or common defense and security. An applicant or licensee violates this requirement if the applicant or licensee fails to notify the Department of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification must be provided to the Department within two working days of identifying the information. This requirement is not applicable to information that is already required to

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Deleted: who delivers licensed material to a carrier for transport, transports the material outside the confines of the person's facility, plant or authorized site of usage, or transports that material on public highways or into any public area. No provision of this section authorizes possession of licensed material.

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be provided to the Department by other reporting or updating requirements.

(4) Requirement for license.

(i) Except as authorized in a general license or a specific license issued by the Department, or as exempted in this section, no person may—

- (A) Deliver licensed material to a carrier for transport; or
- (B) Transport licensed material.

(ii) Exemptions from the requirement for license in §175.105(a)(4) are specified in §175.105(b)(2). General licenses for which no NRC package approval is required are issued in §§175.105(c)(3) and 175.105(c)(4). The general license in §175.105(c)(1) requires that an NRC certificate of compliance or other package approval be issued for the package to be used under the general license. The transport of licensed material or delivery of licensed material to a carrier for transport is subject to the operating controls and procedures requirements of §175.105(d), to the quality assurance requirements of §175.105(e), and to the general provisions of §175.105(a), including USDOT regulations referenced in §175.105(a)(6).

(5) Definitions. The following terms are defined herein for the purpose of this section. These definitions are in addition to those in §175.02. To ensure compatibility with international transportation standards, all limits in this section are given in terms of dual units: The International System of Units (SI) followed or preceded by U.S. standard or customary units. The U.S. customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. For the purpose of this section, either unit may be used.

(i) "Certificate holder" means a person who has been issued a certificate of compliance or other package approval by the U.S. Nuclear Regulatory Commission,

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(ii) "Certificate of Compliance (CoC)" means the certificate issued by the NRC which approves the design of a package for the transportation of radioactive material,

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(iii) "Close reflection by water" means immediate contact by water of sufficient thickness for maximum reflection of neutrons.

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(iv) "Consignment" means each shipment of a package or groups of packages or load of radioactive material offered by a shipper for transport.

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(v) "Containment system" means the assembly of components of the packaging intended to retain the radioactive material during transport.

(vi) Criticality Safety Index (CSI) means the demensionless number (rounded up to the next tenth) assigned to and placed on the label of a fissile material package, to designate the degree of control of accumulation of packages containing fissile material during transportation. Determination of the criticality safety index is described in §§10 CFR 71.22, 71.23, and 71.59,

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(vii) "Low toxicity alpha emitters" means natural uranium, depleted uranium, natural thorium, uranium-235, uranium-238, thorium-232,

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thorium-228 or thorium-230 when contained in ores or physical or chemical concentrates or tailings; or alpha emitters with a half-life of less than 10 days.

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(viii) "Maximum normal operating pressure" means the maximum gauge pressure that would develop in the containment system in a period of 1 year under the heat condition

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specified in 10 CFR 71.71(c)(1), in the absence of venting, external cooling by an ancillary system, or operational controls during transport. ~~j~~“Natural thorium” means thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium-232). ~~x~~“Optimum interspersed hydrogenous moderation” means the presence of hydrogenous material between packages to such an extent that the maximum nuclear reactivity results.

(xi) “Spent nuclear fuel” means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least 1 year’s decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.

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(xii) “Surface Contaminated Object (SCO)” means a solid object that is not itself classed as radioactive material, but which has radioactive material distributed on any of its surfaces. SCO must be in one of two groups with surface activity not exceeding the following limits:

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(A) SCO-I: A solid object on which:

(a) The non-fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4 Bq/cm² (10⁻⁴ microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 0.4 Bq/cm² (10⁻⁵ microcurie/cm²) for all other alpha emitters;

(b) The fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4x10⁴ Bq/cm² (1.0 microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 4x10³ Bq/cm² (0.1 microcurie/cm²) for all other alpha emitters; and

(c) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4x10⁴ Bq/cm² (1 microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 4x10³ Bq/cm² (0.1 microcurie/cm²) for all other alpha emitters.

(B) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:

(a) The non-fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 400 Bq/cm² (10⁻² microcurie/cm²) for beta and gamma and low toxicity alpha emitters or 40 Bq/cm² (10⁻³ microcurie/cm²) for all other alpha emitters;

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(b) The fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8x10⁵ Bq/cm² (20 microcuries/cm²) for beta and gamma and low toxicity alpha emitters, or 8x10⁴ Bq/cm² (2 microcuries/cm²) for all other alpha emitters; and

(c) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8x10⁵ Bq/cm² (20 microcuries/cm²) for beta and gamma and low toxicity alpha emitters, or 8x10⁴ Bq/cm² (2 microcuries/cm²) for all other alpha emitters.

(xiii) “Unirradiated uranium means uranium containing not more than 2×10^3 Bq of plutonium per gram of uranium-235, not more than 9×10^6 Bq of fission products per gram of uranium-235, and not more than 5×10^{-3} g of uranium-236 per gram of uranium-235

(xiv) Uranium — natural, depleted, enriched.

(A) “Natural uranium” means uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238).

(B) “Depleted uranium” means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.

Ⓢ “Enriched uranium” means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.

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(6) Transportation of licensed material

(i) Each licensee who transports licensed material outside the site of usage, as specified in the license or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the USDOT regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport.

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(A) The licensee shall particularly note USDOT regulations in the following areas:

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(a) Packaging— 49 CFR Part 173: Subparts A and B and I.

(b) Marking and labeling— 49 CFR Part 172: Subpart D, Sections 172.400 through 172.407, Sections 172.436 through 172.440, and Subpart E.

(c) Placarding— 49 CFR Part 172: Subpart F, especially Sections 172.500 through 172.519, 172.556, and Appendices B and C.

(d) Accident reporting— 49 CFR Part 171: Sections 171.15 and 171.16.

(e) Shipping papers and emergency information— 49 CFR Part 172: Subparts C and G.

(f) Hazardous material employee training— 49 CFR Part 172: Subpart H.

(g) Hazardous material shipper/carrier registration— 49 CFR Part 107: Subpart G.

(B) The person shall also note USDOT regulations pertaining to the following modes of transportation:

(a) Rail— 49 CFR Part 174: Subparts A through D and K.

(b) Air— 49 CFR Part 175.

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(c) Vessel— 49 CFR Part 176: Subparts A through F and M.

(d) Public Highway— 49 CFR Part 177 and Parts 390 through 397.

(ii) If USDOT regulations are not applicable to a shipment of licensed material, the person shall conform to the standards and requirements of the USDOT specified in §175.105(a)(6)(i) to the same extent as if the shipment or transportation were subject to USDOT regulations.

(b) Exemptions.

(1) Exemption of physicians Any physician licensed by a State to dispense drugs in the practice of medicine is exempt from §175.105(a)(6) with respect to transport by the physician of licensed material for use in the practice of medicine. However, any physician operating under this exemption must be licensed under applicable sections of

this Code. Such transport must not be by public modes of transportation including, but not limited to, buses, subways, trams, taxicabs, car services, trains, ferrys, or other means which would be returned immediately to public use after transporting licensed material.

(2) Exemption for low-level materials

(A) ~~(i) A licensee is exempt from all requirements of this section with respect to shipment or carriage of the following low-level materials: Natural material and ores containing naturally occurring radionuclides that are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in Appendix A, Table A-2 of this section.~~

(B) ~~Materials for which the activity concentration is not greater than the activity concentration values specified in Appendix A, Table A-2 of this section, or for which the consignment activity is not greater than the limit for an exempt consignment found in Appendix A, Table A-2 of this section.~~

(ii) A licensee is exempt from all requirements of this section, other than §175.105(a)(6) and §175.105(d)(4), with respect to shipment or carriage of the following packages, provided the packages contain no fissile material, or the fissile material exemption standards of 10 CFR 71.15 are satisfied:

(A) A package containing no more than a Type A quantity of radioactive material;

(B) A package ~~transported within the United States that contains no more than 0.74 TBq (20 Ci) of special form plutonium-244; or~~

~~C) A package contains only LSA or SCO radioactive material, provided-~~

~~(a) That the LSA or SCO material has an external radiation dose of less than or equal to 10mSv/hr (1 rem/h), at a distance of 3 m from the unshielded material; or (b) That the package contains only LSA-1 or SCO-1 material.~~

(3) Exemption from classification as fissile material

(i) ~~Fissile material meeting the requirements of at least one of the paragraphs of this section are exempt from classification as fissile material and from the fissile material package standards of §§ 10 CFR 71.55 and 71.59, but are subject to all other requirements of this part, except as noted.~~

(ii) ~~Individual package containing 2 grams or less of fissile material~~

(iii) ~~Individual or bulk packaging containing 15 grams or less of fissile material provided the package has at least 200 grams of solid nonfissile material for every gram of fissile material. Lead, beryllium, graphite and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass for solid nonfissile material.~~

(iv) ~~Low concentrations of solid fissile material commingled with solid nonfissile material provided that:~~

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Deleted: in which the only radioactive material is low specific activity (LSA) material or surface contaminated objects (SCO), provided the external radiation level at 3 m from the unshielded material or objects does not exceed 10 mSv/h (1 rem/h);

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Deleted: (iii) A licensee is exempt from all requirements of this section, other than §175.105(a)(6) and §175.105(d)(4), with respect to shipment or carriage of low-specific-activity (LSA) material in group LSA-1, or surface contaminated objects (SCOs) in group SCO-1.

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- (A) There is a least 2000 grams of solid nonfissile material for every gram of fissile material, and
- (B) There is no more than 180 grams of fissile material distributed within 360 kg of contiguous nonfissile material.
- (C) Lead, beryllium, graphite, and hydrogenous material may be present in the package but must not be included in determining the required mass of solid nonfissile material.
- (v) Uranium enriched in uranium-235 to a maximum of 1 percent by weight, and with a total plutonium and uranium-233 content of up to 1 percent of the mass of the uranium-235, provided that the mass of any beryllium, graphite, and hydrogenous material enriched in deuterium constitutes less than 5 percent of the uranium mass.
- (vi) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 percent by mass, with a total plutonium and uranium-233 content not exceeding 0.002 percent of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2. The material must be contained in at least a DOT Type A package.

(c) General Licenses (1) General license: NRC-approved package

(i) A general license is hereby issued to any licensee of the Department to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC.

(ii) This general license applies only to a licensee who—

(A) Has a quality assurance program approved by the Department as satisfying the provisions of §175.105(e) of this Code.

(B) Has a copy of the certificate of compliance, or other approval of the package, and has the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken before shipment; (C) Complies with the terms and conditions of the license, certificate, or other approval, as applicable, and the applicable provisions of the operating controls and procedures requirements of §175.105(d), the quality assurance requirements of §175.105(e), and the general provisions of §175.105(a); and

(D) Submits in writing to the Department, before the licensee's first use of the package, the licensee's name and license number and the package identification number specified in the package approval.

(iii) This general license applies only when the package approval authorizes use of the package under this general license.

(iv) For a Type B or fissile material package, the design of which was approved by NRC before April 1, 1996, the general license is subject to the additional restrictions contained in 10 CFR 71.19.

(2) Previously approved package.

(i) A Type B package previously approved by NRC but not designated as B(U) or B(M) in the identification number of the NRC Certificate of Compliance, may be used under the general license of §175.105(c)(1) with the following additional conditions:

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(A) Fabrication of the packaging was satisfactorily completed by August 31, 1986, as demonstrated by application of its model number in accordance with §175.105(d)(2)(iii);
(B) A package used for a shipment to a location outside the United States is subject to multilateral approval, as defined in USDOT regulations at 49 CFR 173.403; and
(C) A serial number that uniquely identifies each packaging which conforms to the approved design is assigned to, and legibly and durably marked on, the outside of each packaging.

(ii) A Type B(U) package, a Type B(M) package, a low specific activity (LSA) material package or a fissile material package, previously approved by the NRC but without the designation “-85” in the identification number of the NRC Certificate of Compliance, may be used under the general license of §175.105(c)(1) with the following additional conditions:

(A) Fabrication of the package is satisfactorily completed by April 1, 1999 as demonstrated by application of its model number in accordance with §175.105(d)(2)(iii) of this Code;

(B) A package used for a shipment to a location outside the United States is subject to multilateral approval as defined in USDOT regulations at 49 CFR 173.403; and
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(C) A serial number which uniquely identifies each packaging which conforms to the approved design is assigned to and legibly and durably marked on the outside of each packaging.
(3) General license: U.S. Department of Transportation specification container.

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(i) A general license is issued to any licensee of the Department to transport, or to deliver to a carrier for transport, licensed material in a specification container for fissile material or for a Type B quantity of radioactive material as specified in USDOT regulations at 49 CFR Parts 173 and 178.

(ii) This general license applies only to a licensee who has a quality assurance program approved by the Department as satisfying the provisions of §175.105(e) of this Code.

(iii) This general license applies only to a licensee who—

(A) Has a copy of the specification; and

(B) Complies with the terms and conditions of the specification and the applicable provisions of the operating and procedures requirements in §175.105(d), the quality assurance requirements in §175.105(e) and the general provisions contained in §175.105(a).

(iv) This general license is subject to the limitation that the specification container may not be used for a shipment to a location outside the United States, except by multilateral approval, as defined in USDOT regulations at 49 CFR 173.403.

(4) General License: Use of foreign approved package.

(i) A general license is issued to any licensee of the Department to transport, or to deliver to a carrier for transport, licensed material in a package the design of which has been approved in a foreign national competent authority certificate that has been revalidated by USDOT as meeting the applicable requirements of 49 CFR Section 171.12.

(ii) Except as otherwise provided herein, the general license applies only to a licensee who has a quality assurance program approved by the Department as satisfying the applicable provisions of §175.105(e) of this Code.

(iii) This general license applies only to shipments made to or from locations outside the United States.

(iv) This general license applies only to a licensee who—

(A) Has a copy of the applicable certificate, the revalidation, and the drawings and other documents referenced in the certificate, relating to the use and maintenance of the packaging and to the actions to be taken before shipment; and

(B) Complies with the terms and conditions of the certificate and revalidation, and with the applicable provisions of the operating and procedures requirements in §175.105(d), the quality assurance requirements in §175.105(e) and the general provisions in §175.105(a). With respect to the quality assurance provisions of §175.105(e) of this Code, the licensee is exempt from design, construction, and fabrication considerations.

(5) General license: Fissile Material (i) A general license is issued to any licensee of the Department to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section. The fissile material need not be contained in a package which meets the standards of subparts E and F of 10 CFR 71.22; however the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a). (ii) The general license applies only to a licensee who has a quality assurance program approved by the Department as satisfying the provisions of §175.105(e) of this part

(iii) The general license applies only when a package's contents:

(A) Contain less than a Type A quantity of fissile material; and

(B) Contains less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium

(iv) The general license applies only to packages containing fissile material that are labeled with a CSI which:

(A) Has been determined in accordance with section (5) of this section

(B) Has a value less than or equal to 10; and

© For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

(v) (A) The value for the CSI must be greater than or equal to the number calculated by the following equation:

(B) The calculated CSI must be rounded up to the first decimal place;

(C) The values of X, Y, and Z used in the CSI equation must be taken from Tables 71.1 or 71.2 as appropriate;

(D) If Table 71-2 is used to obtain the value of X, then the values of for the terms in the equation for uranium-233 and plutonium must be assumed to be zero; and

(E) Table 71-1 values for X, Y, and Z must be used to determine the CSI if

(a) Uranium-233 is present in the package;

(b) The mass of plutonium exceeds 1 percent of the mass of uranium-235;

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© The uranium is of unknown uranium-235 enrichment or greater than 24 weight percent enrichment; or

(d) Substances having a moderating effectiveness (i.e., an average hydrogen density greater than H₂O) (e.g., certain hydrocarbon oils or plastics) are present in any form, except as polyethylene used for packing or wrapping.

(6) General license: Plutonium/Berillium special form material (i) A

general license is issued to any licensee of the Department to transport fissile material in the form of plutonium-berillium (PU-BE) special form sealed sources, or to deliver Pu-Be sealed sources to a carrier for transport, if the material is shipped in accordance with this section. This material need not be contained in a package which meets the standards of sections --- and --- of this part; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).

(ii) The general license applies only to a licensee who has a quality assurance program approved by the Department as satisfying ----- of this section.

(iii) The general license applies only when a package's contents:

(A) Contain less than a Type A quantity of material; and

(B) Contain less than 1000 g of plutonium, provided that : plutonium-239 plutonium-241, or any combination of these radionuclides, constitute less than 240 g of the total quantity of plutonium in the package.

(iv) The general license applies only to packages labeled with a CSI which:

(A) Has been determined in accordance with part (v) of this section;

(B) Has a value less than or equal to 100;

(C) For a shipment of multiple packages containing Pu-Be sealed sources, the sum of the CSI must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

(v) (A) The value for the CSI must be greater than or equal to the number calculated by the following equation:

$$\text{CSI} = 10 \left[\frac{\text{grams of Pu-239} + \text{grams of Pu-241}}{24} \right]$$

and (B) The calculated CSI must be rounded up to the first decimal place.

(d) Operating Controls and Procedures.

(1) Applicability of operating controls and procedures. A licensee subject to this section, who, under a general or specific license, transports licensed material or delivers licensed material to a carrier for transport, shall comply with the requirements of this subsection,

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with the quality assurance requirements of §175.105(e), and with the general provisions of §175.105(a) of this Code:

(2) Preliminary determinations. Before the first use of any packaging for the shipment of licensed material—

- (i) The licensee shall ascertain that there are no cracks, pinholes, uncontrolled voids, or other defects that could significantly reduce the effectiveness of the packaging;
- (ii) Where the maximum normal operating pressure will exceed 35 kPa (5 lbf/in²) gauge, the licensee shall test the containment system at an internal pressure at least 50 percent higher than the maximum normal operating pressure, to verify the capability of that system to maintain its structural integrity at that pressure; and
- (iii) The licensee shall conspicuously and durably mark the packaging with its model number, serial number, gross weight, and a package identification number assigned by the NRC. Before applying the model number, the licensee shall determine that the packaging has been fabricated in accordance with the design approved by the NRC.

(3) Routine determinations. Before each shipment of licensed material, the licensee shall ensure that the package with its contents satisfies the applicable requirements of this section and of the license. The licensee shall determine that—

- (i) The package is proper for the contents to be shipped;
- (ii) The package is in unimpaired physical condition except for superficial defects such as marks or dents;
- (iii) Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects;
- (iv) Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid;
- (v) Any pressure relief device is operable and set in accordance with written procedures;
- (vi) The package has been loaded and closed in accordance with written procedures;
- (vii) Any structural part of the package that could be used to lift or tie down the package during transport is rendered inoperable for that purpose, unless it satisfies the design requirements of 10 CFR 71.45;
- (viii) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment is as low as

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reasonably achievable, and within the limits specified in USDOT regulations in 49 CFR 173.443;

- (ix) External radiation levels around the package and around the vehicle, if applicable, will not exceed the limits specified in 10 CFR 71.47 at any time during transportation;
- (x) Accessible package surface temperatures will not exceed the limits specified in 10 CFR 71.43(g) at any time during transportation; and

(xi) For fissile material, any moderator or neutron absorber, if required, is present and in proper condition.

(xii) When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile material as if the unknown properties have credible values that will cause the maximum neutron multiplication.

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(4) Air transport of plutonium.

(i) Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this section or included indirectly by citation of 49 CFR Chapter I, as may be applicable, the licensee shall assure that plutonium in any form, whether for import, export, or domestic shipment, is not transported by air or delivered to a carrier for air transport unless:

(A) The plutonium is contained in a medical device designed for individual human application; or

(B) The plutonium is contained in a material in which the specific activity is not greater than 70 Bq/g (0.002mCi/g) of material and in which the radioactivity is essentially uniformly distributed; or

(C) The plutonium is shipped in a single package containing no more than an A2 quantity of plutonium in any isotope or form, and is shipped in accordance with §175.105(a)(6); or

(D) The plutonium is shipped in a package specifically authorized for the shipment of plutonium by air in the Certificate of Compliance for that package issued by the NRC.

(ii) Nothing in §175.105(d)(4)(i) is to be interpreted as removing or diminishing the requirements of 10 CFR 73.24

(iii) For a shipment of plutonium by air which is subject to §175.105(d)(4)(i)(D), the licensee shall, through special arrangement with the carrier, require compliance with 49 CFR 175.704, U.S. Department of Transportation regulations applicable to the air transport of plutonium.

(5) Opening instructions. Before delivery of a package to a carrier for transport, the licensee shall ensure that any special instructions needed to safely open the package have been sent to, or otherwise made available to, the consignee for the consignee's use in accordance with §175.03(j)(6) of this Code.

(6) Records.

(i) Each licensee shall maintain, for a period of 3 years after shipment, a record of each shipment of licensed material not exempt under §175.105(b)(2), showing where applicable—

(A) Identification of the packaging by model number and serial number;

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(B) Verification that there are no significant defects in the packaging, as shipped;

(C) Volume and identification of coolant;

(D) Type and quantity of licensed material in each package, and the total quantity of each shipment;

(E) For each item of irradiated fissile material—

(a) Identification by model number and serial number;

(b) Irradiation and decay history to the extent appropriate to demonstrate that its nuclear and thermal characteristics comply with license conditions; and

(c) Any abnormal or unusual condition relevant to radiation safety;

(F) Date of the shipment;

(G) For fissile packages and for Type B packages, any special controls exercised;

(H) Name and address of the transferee;

(I) Address to which the shipment was made; and

(J) Results of the determinations required by §175.105(d)(3) and by the conditions of the package approval.

(ii) The licensee shall make available to the Department for inspection, upon reasonable notice, all records required by this section. Records are only valid if stamped, initialed, or signed and dated by authorized personnel or otherwise authenticated.

(iii) The licensee shall maintain sufficient written records to furnish evidence of the quality of packaging. The records to be maintained include results of the determinations required by §175.105(d)(2); design, fabrication, and assembly records, results of reviews, inspections, tests, and audits; results of monitoring work performance and materials analyses; and results of maintenance, modification and repair activities. Inspection, test, and audit records must identify the inspector or data recorder, the type of observation, the results, the acceptability and the action taken in connection with any deficiencies noted. The records must be retained for 3 years after the life of the packaging to which they apply.

(7) Inspection and tests.

(i) The licensee or certificate holder shall permit the Department, at all reasonable times, to inspect the licensed material, packaging, premises, and facilities in which the licensed material or packaging is used, provided, constructed, fabricated, tested, stored, or shipped.

(ii) The licensee shall perform, and permit the Department to perform, any tests the Department deems necessary or appropriate for the administration of the requirements of this section.

(iii) The licensee shall notify the Department at least 45 days before fabrication of a package to be used for the shipment of licensed material having a decay heat load in excess of 5kW or with a maximum normal operating pressure in excess of 103kPa (15 lbf/in²) gauge.

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(8) Reports. The licensee shall report to the Department within 30 days—

(i) Any instance in which there is significant reduction in the effectiveness of any approved Type B, or fissile, packaging during use;

(ii) Details of any defects with safety significance in Type B, or fissile, packaging after first use, with the means employed to repair the defects and prevent their recurrence; or

(iii) Instances in which the conditions of approval in the certificate of compliance were not observed in making a shipment.

(9) Advance notification of shipment of irradiated reactor fuel and nuclear waste.

(i) As specified in §§175.105(d)(9) (ii), (iii) and (iv), each licensee shall provide advance notification to the governor of a State, or the governor's designee, and the Department, of the shipment of licensed material, through, or across the boundary of the State, before the transport, or delivery to a carrier, for transport, of licensed material outside the confines of the licensee's plant or other place of use or storage.

(ii) Advance notification is required under this subdivision for shipments of irradiated reactor fuel in quantities less than that subject to advance notification requirements of 10 CFR 73.37(f). Advance notification is also required under this subdivision for shipment of licensed material, other than irradiated fuel, meeting the following three conditions:

(A) The licensed material is required by this section to be in Type B packaging for transportation;

(B) The licensed material is being transported to or across a State boundary en route to a disposal facility or to a collection point for transport to a disposal facility; and

(C) The quantity of licensed material in a single package exceeds the least of the following:

(a) 3000 times the A1 value of the radionuclides as specified in appendix A, Table A-1 for special form radioactive material;

(b) 3000 times the A2 value of the radionuclides as specified in appendix A, Table A-1 for normal form radioactive material; or

(c) 1000 TBq (27,000 Ci).

(iii) Procedures for submitting advance notification.

(A) The notification must be made in writing to the office of each appropriate governor or governor's designee and to the Department.

(B) A notification delivered by mail must be postmarked at least 7 days before the beginning of the 7-day period during which departure of the shipment is estimated to occur.

(C) A notification delivered by by any other means than mail must reach the office of the governor or of the governor's designee and the Department at least 4 days before the beginning of the 7-day period during which departure of the shipment is estimated to occur.

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(a) A list of the names and mailing addresses of the governors' designees receiving advance notification of transportation of nuclear waste was published in the Federal Register on June 30, 1995 (60 FR 34306).

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(b) The list will be published annually in the Federal Register on or about June 30 to reflect any changes in information.

(c) A list of the names and mailing addresses of the governors' designees is available on request from the Director, Office of State Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

(D) The licensee shall retain a copy of the notification as a record for 3 years.

(iv) Information to be furnished in advance notification of shipment. Each advance notification of shipment of irradiated reactor fuel or nuclear waste must contain the following information:

(A) The name, address, and telephone number of the shipper, carrier, and receiver of the irradiated reactor fuel or nuclear waste shipment;

(B) A description of the irradiated reactor fuel or nuclear waste contained in the shipment, as specified in the regulations of USDOT in 49 CFR 172.202 and 172.203(d);

(C) The point of origin of the shipment and the 7-day period during which departure of the shipment is estimated to occur;

(D) The 7-day period during which arrival of the shipment at State boundaries is estimated to occur;

(E) The destination of the shipment, and the 7-day period during which arrival of the shipment is estimated to occur; and

(F) A point of contact, with a telephone number, for current shipment information.

(v) Revision notice. A licensee who finds that schedule information previously furnished to a governor or governor's designee, or the Department, in accordance with

this subdivision, will not be met, shall telephone a responsible individual in the office of the governor of the State or of the governor's designee, and the Department, and inform that individual of the extent of the delay beyond the schedule originally reported. The licensee shall maintain a record of the name of the individual contacted for 3 years.

(vi) Cancellation notice.

(A) Each licensee who cancels an irradiated reactor fuel or nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor of each State or to the governor's designee previously notified, and to the Department.

(B) The licensee shall state in the notice that it is a cancellation and identify the advance notification that is being canceled. The licensee shall retain a copy of the notice as a record for 3 years.

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(e) Quality Assurance

(1) Quality assurance requirements.

(i) Purpose. This subsection describes quality assurance requirements applying to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of components of packaging that are important to safety. As used in this subsection, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of the material or component to predetermined requirements.

(ii) Establishment of program. Each licensee shall establish, maintain, and execute a quality assurance program satisfying each of the applicable criteria of §§175.105(e)(1) through 175.105(e)(19) and satisfying any specific provisions that are applicable to the licensee's activities including procurement of packaging. The licensee shall apply each of the applicable criteria in a graded approach, i.e., to an extent that is consistent with its importance to safety.

(iii) Approval of program. Before the use of any package for the shipment of licensed material subject to this subsection each licensee shall obtain Department approval of its quality assurance program. Each licensee shall file a description of its quality assurance program, including a discussion of which requirements of this subsection are applicable and how they will be satisfied, with the Department.

(iv) Existing package designs. The provisions of this paragraph apply to packages that have been approved for use by the NRC before January 1, 1979, and which have been designed in accordance with the provisions of 10 CFR Part 71 in effect at the time of application for package approval. Those packages will be accepted as having been designed in accordance with a quality assurance program that satisfies the provisions of §175.105(e)(1)(ii) of this Code.

(v) Existing packages. The provisions of this paragraph apply to packages that have been approved for use by the NRC before January 1, 1979; have been at least partially fabricated prior to that date; and for which the fabrication is in accordance with the provisions of 10 CFR Part 71 in effect at the time of application for approval of package design. These packages will be accepted as having been fabricated and assembled in

accordance with a quality assurance program that satisfies the provisions of §175.105(e)(1)(ii) of this Code.

(vi) Previously approved programs. An NRC-approved quality assurance program that satisfies the applicable criteria of Appendix B of 10 CFR Part 50, and that is established, maintained, and executed with

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regard to transport packages, will be accepted as satisfying the requirements of §175.105(e)(1)(ii) of this Code. Before first use, the licensee shall notify the NRC and the Department of its intent to apply its previously approved Appendix B program to transportation activities. The licensee shall identify the program by date of submittal to the NRC and date of NRC approval.

(2) Quality assurance organization

(i) The licensee shall be responsible for the establishment and execution of the quality assurance program. The licensee may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part of the quality assurance program, but shall retain responsibility for the program. The licensee shall clearly establish and delineate, in writing, the authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions.

(ii) The quality assurance functions are—

(A) Assuring that an appropriate quality assurance program is established and effectively executed; and

(B) Verifying, by procedures such as checking, auditing, and inspection, that activities affecting the safety-related functions have been performed correctly.

(iii) The persons and organizations performing quality assurance functions must have sufficient authority and organizational freedom to—

(A) Identify quality problems;

(B) Initiate, recommend, or provide solutions; and

(C) Verify implementation of solutions.

(iv) The persons and organizations performing quality assurance functions shall report to a management level that assures that the required authority and organizational freedom, including sufficient independence from cost and schedule, when opposed to safety considerations, are provided.

(v) Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms, provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational freedom.

(vi) Irrespective of the organizational structure, the individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program, at any location where activities subject to this subsection are being performed, must have direct access to the levels of management necessary to perform this function.

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(3) Quality assurance program

(i) The licensee shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program that complies with the requirements of §§ 175.105(e)(1) through 175.105(e)(19). The licensee shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with those procedures throughout the period during which the packaging is used. The licensee shall identify the material and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organizations.

(ii) The licensee, through its quality assurance program, shall provide control over activities affecting the quality of the identified materials and components to an extent consistent with their importance to safety, and as necessary to assure conformance to the approved design of each individual package used for the shipment of radioactive material. The licensee shall assure that activities affecting quality are accomplished under suitably controlled conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied. The licensee shall take into account the need for special controls, processes, test equipment, tools, and skills to attain required quality, and the need for verification of quality by inspection and test.

(iii) The licensee shall base the requirements and procedures of its quality assurance program on the following considerations concerning the complexity and proposed use of the package and its components:

(A) The impact of malfunction or failure of the item to safety;

(B) The design and fabrication complexity or uniqueness of the item;

(C) The need for special controls and surveillance over processes and equipment;

(D) The degree to which functional compliance can be demonstrated by inspection or test; and

(E) The quality history and degree of standardization of the item.

(iv) The licensee shall provide for indoctrination and training of personnel performing activities affecting quality, as necessary to assure that suitable proficiency is achieved and maintained. The licensee shall review the status and adequacy of the quality assurance program at established intervals. Management of other organizations participating in the quality assurance program shall review regularly the status and adequacy of that part of the quality assurance program which they are executing.

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(4) Package design control

(i) The licensee shall establish measures to assure that applicable requirements and the package design, as specified in the license for those materials and components to which this subdivision applies, are correctly translated into specifications, drawings, procedures, and instructions. These measures must include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from standards are controlled. Measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the materials, parts, and components of the packaging.

(ii) The licensee shall establish measures for the identification and control of design interfaces and for coordination among participating design organizations. These measures must include the establishment of written procedures, among participating design organizations, for the review, approval, release, distribution, and revision of documents involving design interfaces. The design control measures must provide for verifying or checking the adequacy of design, by methods such as design reviews, alternate or simplified calculational methods, or by a suitable testing program. For the verifying or checking process, the licensee shall designate individuals or groups other than those who were responsible for the original design, but who may be from the same organization. Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, the licensee shall include suitable qualification testing of a prototype or sample unit under the most adverse design conditions. The licensee shall apply design control measures to items such as the following:

(A) Criticality physics, radiation shielding, stress, thermal, hydraulic, and accident analyses;

(B) Compatibility of materials;

(C) Accessibility for inservice inspection, maintenance, and repair;

(D) Features to facilitate decontamination; and

(E) Delineation of acceptance criteria for inspections and tests.

(iii) The licensee shall subject design changes, including field changes, to design control measures commensurate with those applied to the original design. Changes in the conditions specified in the package approval require the Department's approval.

(5) Procurement document control. The licensee shall establish measures to assure that adequate quality is required in the documents for procurement of material, equipment, and services, whether purchased by the licensee or by its contractors or subcontractors. To the extent necessary, the licensee shall require contractors or subcontractors to provide a quality assurance program consistent with the applicable provisions of this section.

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(6) Instructions, procedures, and drawings. The licensee shall prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall require that these instructions, procedures, and drawings be followed. The instructions, procedures, and drawings must include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

(7) Document control. The licensee shall establish measures to control the issuance of documents such as instructions, procedures, and drawings, including changes, which prescribe all activities affecting quality. These measures must assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed. These measures must assure that changes to documents are reviewed and approved.

(8) Control of purchased material, equipment, and services.

(i) The licensee shall establish measures to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors,

conform to the procurement documents. These measures must include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products on delivery.

(ii) The licensee shall have available documentary evidence that material and equipment conform to the procurement specifications before installation or use of the material and equipment. The licensee shall retain, or have available, this documentary evidence for the life of the package to which it applies. The licensee shall assure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment.

(iii) The licensee shall assess the effectiveness of the control of quality by contractors and subcontractors at intervals consistent with the importance, complexity, and quantity of the product or services.

(9) Identification and control of materials, parts, and components. The licensee shall establish measures for the identification and control of materials, parts, and components. These measures must assure that identification of the item is maintained by heat number, part number, or other appropriate means, either on the item or on records traceable to the item, as required throughout fabrication, installation, and use of the item. These identification and control measures must be designed to prevent the use of incorrect or defective materials, parts, and components.

(10) Control of special processes. The licensee shall establish measures to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

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(11) Internal inspection. The licensee shall establish and execute a program for inspection of activities affecting quality by or for the organization performing the activity, to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. The inspection must be performed by individuals other than those who performed the activity being inspected. Examination, measurements, or tests of material or products processed must be performed for each work operation where necessary to assure quality. If direct inspection of processed material or products is not carried out, indirect control by monitoring processing methods, equipment, and personnel must be provided. Both inspection and process monitoring must be provided when quality control is inadequate without both. If mandatory inspection hold points, which require witnessing or inspecting by the licensee's designated representative and beyond which work should not proceed without the consent of its designated representative, are required, the specific hold points must be indicated in appropriate documents.

(12) Test control. The licensee shall establish a test program to assure that all testing required to demonstrate that the packaging components will perform satisfactorily in service is identified and performed in accordance with written test procedures that incorporate the requirements of this section and the requirements and acceptance limits contained in the package approval. The test procedures must include provisions for

assuring that all prerequisites for the given test are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. The licensee shall document and evaluate the test results to assure that test requirements have been satisfied.

(13) Control of measuring and test equipment. The licensee shall establish measures to assure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified times to maintain accuracy within necessary limits.

(14) Handling, storage, and shipping control. The licensee shall establish measures to control, in accordance with instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to be used in packaging to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided.

(15) Inspection, test, and operating status

(i) The licensee shall establish measures to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the packaging. These measures must provide for the identification of items that have satisfactorily passed required inspections and tests, where necessary to preclude inadvertent bypassing of the inspections and tests.

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(ii) The licensee shall establish measures to identify the operating status of components of the packaging, such as tagging valves and switches, to prevent inadvertent operation.

(16) Nonconforming materials, parts, or components. The licensee shall establish measures to control materials, parts, or components that do not conform to the licensee's requirements to prevent their inadvertent use or installation. These measures must include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.

(17) Corrective action. The licensee shall establish measures to assure that conditions adverse to quality, such as deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of a significant condition adverse to quality, the measures must assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented and reported to appropriate levels of management.

(18) Quality assurance records. The licensee shall maintain sufficient written records to describe the activities affecting quality. The records must include the instructions, procedures, and drawings required by subdivision (6) of this subsection, to prescribe quality assurance activities and must include closely related specifications such as required qualifications of personnel, procedures, and equipment. The records must include the instructions or procedures which establish a records retention program that is consistent with applicable requirements and designates factors such as duration, location, and assigned responsibility. The licensee shall retain these records for 3 years beyond the

date when the licensee last engages in the activity for which the quality assurance program was developed. If any portion of the written procedures or instructions is superseded, the licensee shall retain the superseded material for 3 years after it is superseded.

(19) Audits. The licensee shall carry out a comprehensive system of planned and periodic audits, to verify compliance with all aspects of the quality assurance program, and to determine the effectiveness of the program. The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibilities in the areas being audited. Audited results must be documented and reviewed by management having responsibility in the area audited. Follow-up action, including reaudit of deficient areas, must be taken where indicated.
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APPENDIX A

DETERMINATION OF A1 AND A2

I. Values of A1 and A2 for individual radionuclides, which are the bases for many activity limits elsewhere in this Code are given in Table A-1. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) figure. The curie values are expressed to three significant figures to assure that the difference in the TBq and Ci quantities is one tenth of one percent or less. Where values of A1 or A2 are unlimited, it is for radiation control purposes only. For nuclear criticality safety, some materials are subject to controls placed on fissile material.

11.a. For individual radionuclides whose identities are known, but which are not listed in Table A-1, the A1 and A2 values contained in 10 CFR 71 Table A-3 may be used. Otherwise, the licensee shall obtain prior Department approval of the A1 and A2 values for radionuclides not listed in Table A1, before shipping the material.

11.b. For individual radionuclides whose identities are known, but which are not listed in Table A2 of this appendix, the exempt material activity concentration and exempt consignment activity values contained 10 CFR 71 Table A-3 may be used. Otherwise, the licensee shall obtain prior Department approval of the exempt material activity concentration and exempt consignment activity values for radionuclides not listed in Table 2, before shipping the material.

11.c. The licensee shall submit requests for prior approval, described in 11.a. and 11.b. of this appendix, to the Department in accordance with § 175.105(a) of this part.

III. In the calculations of A1 and A2 for a radionuclide not in Table A-1, a single radioactive decay chain, in which radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days, or longer than that of the parent nuclide, shall be considered as a single radionuclide, and the activity to be taken into account, and the A1 or A2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days, or greater than that of the parent nuclide, the parent and those daughter nuclides shall be considered as mixtures of different nuclides.

IV. For mixtures of radionuclides whose identities and respective activities are known, the following conditions apply:

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(a) For special form radioactive material, the maximum quantity transported in a Type A package:

$$\sum_i B(i) < FT: "Symbol" > \times 1$$

$$A1(i)$$

(b) For normal form radioactive material, the maximum quantity transported in a Type A package:

$$\sum_i B(i) < FT: "Symbol" > \times 1$$

$$A2(i)$$

Where $B(i)$ is the activity of radionuclide i and $A1(i)$ and $A2$ values for radionuclide i , respectively.

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Alternatively, an $A1$ value for mixtures of special form material may be determined as follows:

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$$A1 \text{ for mixture} = \sum_i$$

$$\sum_i \frac{f(i)}{A1(i)}$$

Where $f(i)$ is the fraction of activity of nuclide i in the mixture and $A1(i)$ is the appropriate $A1$ value for nuclide i .

An $A2$ value for mixtures of normal form material may be determined as follows:

$$A2 \text{ for mixture} = \sum_i$$

$$\sum_i \frac{f(i)}{A2(i)}$$

Where $f(i)$ is the fraction of activity of nuclide i in the mixture and $A2(i)$ is the appropriate $A2$ value for nuclide i .

V. When the identity of each radionuclide is known, but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest $A1$ or $A2$ value, as appropriate, for the radionuclides in each group may be used in applying

the formulas in paragraph IV. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A1 or A2 values for the alpha emitters and beta/gamma emitters.

Table A-1

A1 AND A2 VALUES FOR RADIONUCLIDES

(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TBq)	A1(Ci)	A2(TBq)	A2(Ci)	Specific Activity (Ci/g)
Ac-225	Actinium(89)	0.6	16.2	1×10^{-2}	0.270	2.1×10^3
Ac-227	40	1080	2×10^{-5}	5.41×10^{-4}	2.7	7.2×10^1
Ac-228	0.6	16.2	0.4	10.8	8.4×10^4	2.2×10^6
Ag-105	Silver(47)	2	54.1	2	54.1	1.1×10^3
Ag-108m	0.6	16.2	0.6	16.2	9.7×10^{-1}	2.6×10^1
Ag-110m	0.4	10.8	0.4	10.8	1.8×10^2	4.7×10^3
Ag-111	0.6	16.2	0.5	13.5	5.8×10^3	1.6×10^5
Al-26	Aluminum(13)	0.4	10.8	0.4	10.8	7.0×10^{-4}
Am-241	Americium(95)	2	54.1	2×10^{-4}	5.41×10^{-3}	1.3×10^1
Am-242m	2	54.1	2×10^{-4}	5.41×10^{-3}		3.6×10^{-1}
Am-243	2	54.1	2×10^{-4}	5.41×10^{-3}		7.4×10^{-3}

Ar-37	Argon(18)	40	1080	40	1080	3.7x10 ³	9.9x10 ⁴
Ar-39		20	541	20	541	1.3	3.4x10 ¹
Ar-41		0.6	16.2	0.6	16.2	1.5x10 ⁶	4.2x10 ⁷
Ar-42		0.2	5.41	0.2	5.41	9.6	2.6x10 ²
As-72	Arsenic(33)	0.2	5.41	0.2	5.41	6.2x10 ⁴	1.7x10 ⁶
As-73		40	1080	40	1080	8.2x10 ²	2.2x10 ⁴
As-74		1	27.0	0.5	13.5	3.7x10 ³	9.9x10 ⁴
As-76		0.2	5.41	0.2	5.41	5.8x10 ⁴	1.6x10 ⁶

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Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TB A1(Ci) q)	A2(TBq) (TBq/g)	A2(Ci) Specific Activity (Ci/g)
As-77	20 541	0.5	13.5	3.9x10 ⁴ 1.0x10 ⁶
At-211	Astatine(85) 30	811	2	54.1 7.6x10 ⁴ 2.1x10 ⁶
Au-193 9.2x10 ⁵	Gold(79)	6	162	6 162 3.4x10 ⁴
Au-194	1	27.0	1	27.0 1.5x10 ⁴ 4.1x10 ⁵
Au-195	10	270	10	270 1.4x10 ² 3.7x10 ³
Au-198	3	81.1	0.5	13.5 9.0x10 ³ 2.4x10 ⁵
Au-199	10	270	0.9	24.3 7.7x10 ³ 2.1x10 ⁵

Ba-131	Barium(56)	2	54.1	2	54.1	3.1x10 ³	8.4x10 ⁴
Ba-133m		10	270	0.9	24.3	2.2x10 ⁴	6.1x10 ⁵
Ba-133		3	81.1	3	81.1	9.4	2.6x10 ²
Ba-140		0.4	10.8	0.4	10.8	2.7x10 ³	7.3x10 ⁴
Be-7	Beryllium(4)	20	541	20	541	1.3x10 ⁴	3.5x10 ⁵
Be-10		20	541	0.5	13.5	8.3x10 ⁻⁴	2.2x10 ⁻²
Bi-205	Bismuth(83)	0.6	16.2	0.6	16.2	1.5x10 ³	4.2x10 ⁴
Bi-206		0.3	8.11	0.3	8.11	3.8x10 ³	1.0x10 ⁵
Bi-207		0.7	18.9	0.7	18.9	1.9	5.2x10 ¹
Bi-210m		0.3	8.11	3x10 ⁻²⁰	0.811	2.1x10 ⁻⁵	5.7x10 ⁻⁴
Bi-210		0.6	16.2	0.5	13.5	4.6x10 ³	1.2x10 ⁵
Bi-212		0.3	8.11	0.3	8.11	5.4x10 ⁵	1.5x10 ⁷
Bk-247	Berkelium(97)	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³		3.8x10 ⁻²
Bk-249		40	1080	8x10 ⁻²	2.16	6.1x10 ¹	1.6x10 ³
Br-76	Bromine(35)	0.3	8.11	0.3	8.11	9.4x10 ⁴	2.5x10 ⁶
Br-77		3	81.1	3	81.1	2.6x10 ⁴	7.1x10 ⁵
Br-82		0.4	10.8	0.4	10.8	4.0x10 ⁴	1.1x10 ⁶
C-11	Carbon(6)	1	27	0.5	13.5	3.1x10 ⁷	8.4x10 ⁸
C-14		40	1080	2	54.1	1.6x10 ⁻¹	4.5
Ca-41	Calcium(20)	40	1080	40	1080	3.1x10 ⁻³	8.5x10 ⁻²
Ca-45		40	1080	0.9	24.3	6.6x10 ²	1.8x10 ⁴
Ca-47		0.9	24.3	0.5	13.5	2.3x10 ⁴	6.1x10 ⁵

Cd-109 2.6x10 ³	Cadmium(48)	40	1080	1	27.0	9.6x10 ¹	
Cd-113m		20	541	9x10 ⁻²	2.43	8.3x10 ⁴	2.2x10 ²
Cd-115m		0.3	8.11	0.3	8.11	9.4x10 ²	2.5x10 ⁴
Cd-115		4	108	0.5	13.5	1.9x10 ⁴	5.1x10 ⁵
Ce-139	Cerium(58)	6	162	6	162	2.5x10 ²⁶	.8x10 ³
Ce-143		0.6	16.2	0.5	13.5	2.5x10 ⁴	6.6x10 ⁵
Ce-144		0.2	5.41	0.2	5.41	1.2x10 ²	3.2x10 ³
Cf-248 1.6x10 ³	Californium(98)	30	811	3x10 ⁻³	8.11x10		5.8x10 ¹
				-2			
Cf-249		2	54.1	2x10 ⁻⁴	5.41x10	1.5x10 ⁻¹	4.1
				-3			
Cf-250		5	135	5x10 ⁻⁴	1.35x10	4.0	1.1x10 ²
				-2			
Cf-251		2	54.1	2x10 ⁻⁴	5.41x10	5.9x10 ⁻²	1.6
				-3			
Cf-252		0.1	2.70	1x10 ⁻³	2.70x10	2.0x10 ¹	5.4x10 ²
				-2			
Cf-253		40	1080	6x10 ⁻²	1.62	1.1x10 ³	2.9x10 ⁴
Cf-254 8.5x10 ³		3x10 ⁻³	8.11x10 ⁻²	6x10 ⁻⁴	1.62x10	3.1x10 ²	
				-2			
Cl-36	Chlorine(17)	20	541	0.5	13.5	1.2x10 ⁻³	3.3x10 ⁻²

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number		A1(TB	A1(Ci	A2(TBq)	A2(Ci)	Specific Activity	
			q)		(TBq/g)	(Ci/g)		
Cl-38	0.2	5.41	0.2	5.41	4.9x10 ⁶	1.3x10 ⁸		
Cm-240 2.0x10 ⁴	Curium(96)		40	1080	2x10 ⁻²	0.541	7.5x10 ²	
Cm-241	2	54.1	0.9	24.3	6.1x10 ²	1.7x10 ⁴		
Cm-242	40	1080	1x10 ⁻²	0.270	1.2x10 ²	3.3x10 ³		
Cm-243	3	81.1	3x10 ⁻⁴	8.11x10 ⁻³	1.9	5.2x10 ¹		
Cm-244	4	108	4x10 ⁻⁴	1.08x10 ⁻²	3.0	8.1x10 ⁵		
Cm-245 1.7x10 ⁻¹	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³	6.4x10 ⁻³			
Cm-246 3.1x10 ⁻¹	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³	1.1x10 ⁻²			
Cm-247 9.3x10 ⁻⁵	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³	3.4x10 ⁻⁶			
Cm-248 4.2x10 ⁻³	4x10 ⁻²	1.08	5x10 ⁻⁵	1.35x10 ⁻³	1.6x10 ⁻⁴			
Co-55	Cobalt(27)		0.5	13.5	0.5	13.5	1.1x10 ⁵	3.1x10 ⁶
Co-56	0.3	8.11	0.3	8.11	1.1x10 ³	3.0x10 ⁴		
Co-57	8	216	8	216	3.1x10 ²	8.4x10 ³		
Co-58m	40	1080	40	1080	2.2x10 ⁵	5.9x10 ⁶		
Co-58	1	27.0	1	27.0	1.2x10 ³	3.2x10 ⁴		

Co-60	0.4	10.8	0.4	10.8	4.2x10 ¹	1.1x10 ³	
Cr-51 Chromium(24)	30	811	30	811	3.4x10 ³	9.2x10 ⁴	
Cs-129 Cesium(55)	4	108	4	103	2.8x10 ⁴	7.6x10 ⁵	
Cs-131	40	1080	40	1080	3.8x10 ³	1.0x10 ⁵	
Cs-132	1	27.0	1	27.0	5.7x10 ³	1.5x10 ⁵	
Cs-134m	40	1080	9	243	3.0x10 ⁵	8.0x10 ⁶	
Cs-134	0.6	16.2	0.5	13.5	4.8x10 ¹	1.3x10 ³	
Cs-135	40	1080	0.9	24.3	4.3x10 ⁻⁵	1.2x10 ⁻³	
Cs-136	0.5	13.5	0.5	13.5	2.7x10 ³	7.3x10 ⁴	
Cs-137	2	54.1	0.5	13.5	3.2	8.7x10 ¹	
Cu-64 Copper(29)	5	135	0.9	24.3	1.4x10 ⁵	3.9x10 ⁶	
Cu-67	9	243	0.9	24.3	2.8x10 ⁴	7.6x10 ⁵	
Dy-159 5.7x10 ³	Dysprosium(66)		20	541	20	541	2.1x10 ²
Dy-165	0.6	16.2	0.5	13.5	3.0x10 ⁵	8.2x10 ⁶	
Dy-166	0.3	8.11	0.3	8.11	8.6x10 ³	2.3x10 ⁵	
Er-169 Erbium(68)	40	1080	0.9	24.3	3.1x10 ³	8.3x10 ⁴	
Er-171	0.6	16.2	0.5	13.5	9.0x10 ⁴	2.4x10 ⁶	
Es-253 Einsteinium(99)a	200	5400	2.1x10 ⁻²	-1	5.4x10 ⁰		
Es-254	30	811	3x10 ⁻³	8.11x10 ⁻²			
Es-254m	0.6	16.2	0.4	10.8			
Es-255							

Eu-147	Europium(63)	2	54.1	2	54.1	1.4x10 ³	3.7x10 ⁴
Eu-148		0.5	13.5	0.5	13.5	6.0x10 ²	1.6x10 ⁴
Eu-149		20	541	20	541	3.5x10 ²	9.4x10 ³
Eu-150		0.7	18.9	0.7	18.9	6.1x10 ⁴	1.6x10 ⁶
Eu-152m		0.6	16.2	0.5	13.5	8.2x10 ⁴	2.2x10 ⁶
Eu-152		0.9	24.3	0.9	24.3	6.5	1.8x10 ²
Eu-154		0.8	21.6	0.5	13.5	9.8	2.6x10 ²
Eu-155		20	541	2	54.1	1.8x10 ¹	4.9x10 ²

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TB q)	A1(Ci q)	A2(TBq (TBq/g)	A2(Ci (Ci/g)	Specific Activity	
Eu-156	0.6	16.2	0.5	13.5	2.0x10 ³	5.5x10 ⁴	
F-18	Fluorine(9)	1	27.0	0.5	13.5	3.5x10 ⁶	9.5x10 ⁷
Fe-52	Iron(26)	0.2	5.41	0.2	5.41	2.7x10 ⁵	7.3x10 ⁶
Fe-55	40	1080	40	1080	8.8x10 ¹	2.4x10 ³	
Fe-59	0.8	21.6	0.8	21.6	1.8x10 ³	5.0x10 ⁴	
Fe-60	40	1080	0.2	5.41	7.4x10 ⁻⁴	2.0x10 ⁻²	
Fm-255	Fermium(100)b	40	1080	0.8	21.6		
Fm-257	10	270	8x10 ⁻³	21.6x10 ⁻¹			

Ga-67	Gallium(31)	6	162	6	162	2.2x10 ⁴	6.0x10 ⁵
Ga-68		0.3	8.11	0.3	8.11	1.5x10 ⁶	4.1x10 ⁷
Ga-72		0.4	10.8	0.4	10.8	1.1x10 ⁵	3.1x10 ⁶
Gd-146	Gadolinium(64)			0.4	10.8	0.4	10.8
1.9x10 ⁴							6.9x10 ²
Gd-148		3	81.1	3x10 ⁻⁴	8.11x10 ⁻³	1.2	3.2x10 ¹
Gd-153		10	270	5	135	1.3x10 ²	3.5x10 ³
Gd-159		4	108	0.5	13.5	3.9x10 ⁴	1.1x10 ⁶
Ge-68	Germanium(32)		0.3	8.11	0.3	8.11	2.6x10 ²
7.1x10 ³							
Ge-71		40	1080	40	1080	5.8x10 ³	1.6x10 ⁵
Ge-77		0.3	8.11	0.3	8.11	1.3x10 ⁵	3.6x10 ⁶
H-3	Hydrogen(1) See T-Tritium						
Hf-172	Hafnium(72)	0.5	13.5	0.3	8.11	4.1x10 ¹	1.1x10 ³
Hf-175		3	81.1	3	81.1	3.9x10 ²	1.1x10 ⁴
Hf-181		2	54.1	0.9	24.3	6.3x10 ²	1.7x10 ⁴
Hf-182		4	108	3x10 ⁻²	0.811	8.1x10 ⁻⁶	2.2x10 ⁻⁴
Hg-194	Mercury(80)	1	27.0	1	27.0	1.3x10 ⁻⁴	3.5
Hg-195m		5	135	5	135	1.5x10 ⁴	4.0x10 ⁵
Hg-197m		10	270	0.9	24.3	2.5x10 ⁴	6.7x10 ⁵
Hg-197		10	270	10	270	9.2x10 ³	2.5x10 ⁵
Hg-203		4	108	0.9	24.3	5.1x10 ²	1.4x10 ⁴
Ho-163	Holmium(67)	40	1080	40	1080	2.7	7.6x10 ¹

Ho-166m	0.6	16.2	0.3	8.11	6.6x10 ⁻²	1.8
Ho-166	0.3	8.11	0.3	8.11	2.6x10 ⁴	7.0x10 ⁵
I-123 Iodine(53)	6	162	6	162	7.1x10 ⁴	1.9x10 ⁶
I-124	0.9	24.3	0.9	24.3	9.3x10 ³	2.5x10 ⁵
I-125	20	541	2	54.1	6.4x10 ²	1.7x10 ⁴
I-126	2	54.1	0.9	24.3	2.9x10 ³	8.0x10 ⁴
I-129 1.8x10 ⁻⁴	Unlimi ted	Unlimi ted	Unlimited ed	Unlimit		6.5x10 ⁻⁶
I-131	3	81.1	0.5	13.5	4.6x10 ³	1.2x10 ⁵
I-132	0.4	10.8	0.4	10.8	3.8x10 ⁵	1.0x10 ⁷
I-133	0.6	16.2	0.5	13.5	4.2x10 ⁴	1.1x10 ⁶
I-134	0.3	8.11	0.3	8.11	9.9x10 ⁵	2.7x10 ⁷
I-135	0.6	16.2	0.5	13.5	1.3x10 ⁵	3.5x10 ⁶
In-111 Indium(49)	2	54.1	2	54.1	1.5x10 ⁴	4.2x10 ⁵
In-113m	4	108	4	108	6.2x10 ⁵	1.7x10 ⁷

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TB q)	A1(Ci)	A2(TBq)	A2(Ci)	Specific Activity
				(TBq/g)	(Ci/g)	
In-114m	0.3	8.11	0.3	8.11	8.6x10 ²	2.3x10 ⁴

In-115m	6	162	0.9	24.3	2.2x10 ⁵	6.1x10 ⁶
Ir-189 Iridium(77)	10	270	10	270	1.9x10 ³	5.2x10 ⁴
Ir-190	0.7	18.9	0.7	18.9	2.3x10 ³	6.2x10 ⁴
Ir-192	1	27.0	0.5	13.5	3.4x10 ²	9.2x10 ³
Ir-193m	10	270	10	270	2.4x10 ³	6.4x10 ⁴
Ir-194	0.2	5.41	0.2	5.41	3.1x10 ⁴	8.4x10 ⁵
K-40 Potassium(19)	0.6	16.2	0.6	16.2	2.4x10 ⁻⁷	6.4x10 ⁻⁶
K-42	0.2	5.41	0.2	5.41	2.2x10 ⁵	6.0x10 ⁶
K-43	1.0	27.0	0.5	13.5	1.2x10 ⁵	3.3x10 ⁶
Kr-81 Krypton(36)	40	1080	40	1080	7.8x10 ⁻⁴	2.1x10 ⁻²
Kr-85m	6	162	6	162	3.0x10 ⁵	8.2x10 ⁶
Kr-85	20	541	10	270	1.5x10 ¹	3.9x10 ²
Kr-87	0.2	5.41	0.2	5.41	1.0x10 ⁶	2.8x10 ⁷
La-137 Lanthanum(57)	40	1080	2	54.1	1.6x10 ⁻³	4.4x10 ⁻²
La-140	0.4	10.8	0.4	10.8	2.1x10 ⁴	5.6x10 ⁵
Lu-172 Lutetium(71)	0.5	13.5	0.5	13.5	4.2x10 ³	1.1x10 ⁵
Lu-173	8	216	8	216	5.6x10 ¹	1.5x10 ³
Lu-174m	20	541	8	216	2.0x10 ²	5.3x10 ³
Lu-74	8	216	4	108	2.3x10 ¹	6.2x10 ²
Lu-177	30	811	0.9	24.3	4.1x10 ³	1.1x10 ⁵
MFP (see 49 CFR 173.433)						
Mg-28 Magnesium(12)	0.2	5.41	0.2	5.41	2.0x10 ⁵	5.4x10 ⁶

Mn-52	Manganese(25)	0.3	8.11	0.3	8.11	1.6x10 ⁴	4.4x10 ⁵
Mn-53	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	6.8x10 ⁻⁵	
1.8x10 ⁻³							
Mn-54		1	27.0	1	27.0	2.9x10 ²	7.7x10 ³
Mn-56		0.2	5.41	0.2	5.41	8.0x10 ⁵	2.2x10 ⁷
Mo-93	Molybdenum(42)	40	1080	7	189	4.1x10 ⁻²	1.1
Mo-99		0.6	16.2	0.5	13.5c	1.8x10 ⁴	4.8x10 ⁵
N-13	Nitrogen(7)	0.6	16.2	0.5	13.5	5.4x10 ⁷	1.5x10 ⁹
Na-22	Sodium(11)	0.5	13.5	0.5	13.5	2.3x10 ²	6.3x10 ³
Na-24		0.2	5.41	0.2	5.41	3.2x10 ⁵	8.7x10 ⁶
Nb-92m	Niobium(41)	0.7	18.9	0.7	18.9	5.2x10 ³	
1.4x10 ⁵							
Nb-93m		40	1080	6	162	8.8	2.4x10 ²
Nb-94		0.6	16.2	0.6	16.2	6.9x10 ⁻³	1.9x10 ⁻¹
Nb-95		1	27.0	1	27.0	1.5x10 ³	3.9x10 ⁴
Nb-97		0.6	16.2	0.5	13.5	9.9x10 ⁵	2.7x10 ⁷
Nd-147	Neodymium(60)			4	108	0.5	13.5
8.1x10 ⁴							3.0x10 ³
Nd-149		0.6	16.2	0.5	13.5	4.5x10 ⁵	1.2x10 ⁷
Ni-59	Nickel(28)	40	1080	40	1080	3.0x10 ⁻³	8.0x10 ⁻²
Ni-63		40	1080	30	811	2.1	5.7x10 ¹
Ni-65		0.3	8.11	0.3	8.11	7.1x10 ⁵	1.9x10 ⁷
Np-235	Neptunium(9)	40	1080	40	1080	5.2x10 ¹	
1.4x10 ³							

3)

Np-236 7 189 1x10-3 2.70x10 4.7x104
 1.3x10-2

-2

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES

(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TB A1(Ci) q)	A2(TBq) (TBq/g)	A2(Ci) Specific Activity (Ci/g)
Np-237 7.1x104	2	54.1	2x10-4 5.41x10	2.6x10-5
			-3	
Np-239	6	162	0.5 13.5 8.6x103	2.3x105
Os-185 Osmium(76)	1	27.0	1 27.0 2.8x102	7.5x103
Os-191m	40	1080	40 1080 4.6x104	1.3x106
Os-191	10	270	0.9 24.3 1.6x103	4.4x104
Os-193	0.6	16.2	0.5 13.5 2.0x104	5.3x105
Os-194	0.2	5.41	0.2 5.41 1.1x101	3.1x102
P-32 Phosphorus(15) 2.9x105		0.3	8.11 0.3 8.11	1.1x104
P-33	40	1080	0.9 24.3 5.8x103	1.6x105
Pa-230 Protactinium(91)	2	54.1	0.1 2.70 1.2x103	3.3x104
Pa-231	0.6	16.2	6x10-3 1.62x10 1.7x10-3	4.7x10-2

-3

Pa-233	5	135	0.9	24.3	7.7x10 ²	2.1x10 ⁴	
Pb-201 Lead(82)	1	27.0	1	27.0	6.2x10 ⁴	1.7x10 ⁶	
Pb-202	40	1080	2	54.1	1.2x10 ⁻⁴	3.4x10 ⁻³	
Pb-203	3	81.1	3	81.1	1.1x10 ⁴	3.0x10 ⁵	
Pb-205 1.2x10 ⁻⁴	Unlimi ted	Unlimi ted	Unlimited ed		Unlimit	4.5x10 ⁻⁶	
Pb-210	0.6	16.2	9x10 ⁻³	0.243	2.8	7.6x10 ¹	
Pb-212	0.3	8.11	0.3	8.11	5.1x10 ⁴	1.4x10 ⁶	
Pd-103 Palladium(46)	40	1080	40	1080	2.8x10 ³	7.5x10 ⁴	
Pd-107 5.1x10 ⁻⁴	Unlimi ted	Unlimi ted	Unlimited ed		Unlimit	1.9x10 ⁻⁵	
Pd-109	0.6	16.2	0.5	13.5	7.9x10 ⁴	2.1x10 ⁶	
Pm-143 3.4x10 ³ 61)	Promethium(3	81.1	3	81.1	1.3x10 ²	
Pm-144		0.6	16.2	0.6	16.2	9.2x10 ¹	2.5x10 ³
Pm-145		30	811	7	189	5.2	1.4x10 ²
Pm-147		40	1080	0.9	24.3	3.4x10 ¹	9.3x10 ²
Pm-148m		0.5	13.5	0.5	13.5	7.9x10 ²	2.1x10 ⁴
Pm-149		0.6	16.2	0.5	13.5	1.5x10 ⁴	4.0x10 ⁵
Pm-151		3	81.1	0.5	13.5	2.7x10 ⁴	7.3x10 ⁵
Po-208 Polonium(84)	40	1080	2x10 ⁻²	0.541	2.2x10 ¹	5.9x10 ²	
Po-209	40	1080	2x10 ⁻²	0.541	6.2x10 ⁻¹	1.7x10 ¹	
Po-210	40	1080	2x10 ⁻²	0.541	1.7x10 ²	4.5x10 ³	

Pr-142 Praseodymium(59)	0.2	5.41	0.2	5.41	4.3x10 ⁴	1.2x10 ⁶	
Pr-143	4	108	0.5	13.5	2.5x10 ³	6.7x10 ⁴	
Pt-188 Platinum(78)	0.6	16.2	0.6	16.2	2.5x10 ³	6.8x10 ⁴	
Pt-191	3	81.1	3	81.1	8.7x10 ³	2.4x10 ⁵	
Pt-193m		40	1080	9	243	5.8x10 ³	1.6x10 ⁵
Pt-193	40	1080	40	1080	1.4	3.7x10 ¹	
Pt-195m		10	270	2	54.1	6.2x10 ³	1.7x10 ⁵
Pt-197m		10	270	0.9	24.3	3.7x10 ⁵	1.0x10 ⁷
Pt-197	20	541	0.5	13.5	3.2x10 ⁴	8.7x10 ⁵	
Pu-236 Plutonium(94)	7	189	7x10 ⁻⁴	1.89x10 ⁻²		2.0x10 ¹	
				-2			
Pu-237	20	541	20	541	4.5x10 ²	1.2x10 ⁴	
Pu-238	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³		6.3x10 ⁻¹	1.7x10 ¹
				-3			
Pu-239	2	54.1	2x10 ⁻⁴	5.41x10 ⁻³		2.3x10 ⁻³	6.2x10 ⁻²
				-3			

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TBq/g)	A1(Ci/g)	A2(TBq/g)	A2(Ci/g)	Specific Activity
Pu-240	2 54.1	2x10 ⁻⁴	5.41x10 ⁻³	8.4x10 ⁻³	2.3x10 ⁻¹	
						-3

Pu-241	40	1080	1x10-2	0.270	3.8	1.0x10 ²	
Pu-242	2	54.1	2x10-4	5.41x10 ⁻³		1.5x10 ⁻⁴	3.9x10 ⁻³
Pu-244	0.3	8.11	2x10-4	5.41x10 ⁻³		6.7x10 ⁻⁷	1.8x10 ⁻⁵
Ra-223 Radium(88)	0.6	16.2	3x10-2	0.811		1.9x10 ³	5.1x10 ⁴
Ra-224	0.3	8.11	6x10-2	1.62		5.9x10 ³	1.6x10 ⁵
Ra-225	0.6	16.2	2x10-2	0.541		1.5x10 ³	3.9x10 ⁴
Ra-226	0.3	8.11	2x10-2	0.541		3.7x10 ⁻²	1.0
Ra-228	0.6	16.2	4x10-2	1.08		1.0x10 ¹	2.7x10 ²
Rb-81 Rubidium(37)	2	54.1	0.9	24.3		3.1x10 ⁵	8.4x10 ⁶
Rb-83	2	54.1	2	54.1		6.8x10 ²	1.8x10 ⁴
Rb-84	1	27.0	0.9	24.3		1.8x10 ³	4.7x10 ⁴
Rb-86	0.3	8.11	0.3	8.11		3.0x10 ³	8.1x10 ⁴
Rb-87 8.6x10 ⁻⁸	Unlimited	Unlimited	Unlimited			Unlimited	3.2x10 ⁻⁹
Rb (natural) 1.8x10 ⁸	Unlimited	Unlimited	Unlimited			Unlimited	6.7x10 ⁶
Re-183 Rhenium(75)	5	135	5	135		3.8x10 ²	1.0x10 ⁴
Re-184m	3	81.1	3	81.1		1.6x10 ²	4.3x10 ³
Re-184	1	27.0	1	27.0		6.9x10 ²	1.9x10 ⁴
Re-186	4	108	0.5	13.5		6.9x10 ³	1.9x10 ⁵
Re-187 3.8x10 ⁻⁸	Unlimited	Unlimited	Unlimited			Unlimited	1.4x10 ⁻⁹

Re-188	0.2	5.41	0.2	5.41	3.6x10 ⁴	9.8x10 ⁵
Re-189	4	108	0.5	13.5	2.5x10 ⁴	6.8x10 ⁵
Re (natural) 2.4x10 ⁸		Unlimi ted	Unlimi ted	Unlimited ed	Unlimit	----
Rh-99 Rhodium(45)	2	54.1	2	54.1	3.0x10 ³	8.2x10 ⁴
Rh-101	4	108	4	108	4.1x10 ¹	1.1x10 ³
Rh-102m	2	54.1	0.9	24.3	2.3x10 ²	6.2x10 ³
Rh-102	0.5	13.5	0.5	13.5	4.5x10 ¹	1.2x10 ³
Rh-103m	40	1080	40	1080	1.2x10 ⁶	3.3x10 ⁷
Rh-105	10	270	0.9	24.3	3.1x10 ⁴	8.4x10 ⁵
Rn-222 1.5x10 ⁵	Radon(86)	0.2	5.41	4x10 ⁻³	0.108	5.7x10 ³
Ru-97 Ruthenium(44)	4	108	4	108	1.7x10 ⁴	4.6x10 ⁵
Ru-103	2	54.1	0.9	24.3	1.2x10 ³	3.2x10 ⁴
Ru-105	0.6	16.2	0.5	13.5	2.5x10 ⁵	6.7x10 ⁶
Ru-106	0.2	5.41	0.2	5.41	1.2x10 ²	3.3x10 ³
S-35 Sulfur(16)	40	1080	2	54.1	1.6x10 ³	4.3x10 ⁴
Sb-122 Antimony(51)	0.3	8.11	0.3	8.11	1.5x10 ⁴	4.0x10 ⁵
Sb-124	0.6	16.2	0.5	13.5	6.5x10 ²	1.7x10 ⁴
Sb-125	2	54.1	0.9	24.3	3.9x10 ¹	1.0x10 ³
Sb-126	0.4	10.8	0.4	10.8	3.1x10 ³	8.4x10 ⁴
Sc-44 Scandium(21)	0.5	13.5	0.5	13.5	6.7x10 ⁵	1.8x10 ⁷
Sc-46	0.5	13.5	0.5	13.5	1.3x10 ³	3.4x10 ⁴

Sc-47	9	243	0.9	24.3	3.1x10 ⁴	8.3x10 ⁵
Sc-48	0.3	8.11	0.3	8.11	5.5x10 ⁴	1.5x10 ⁶

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of radionuclide	Element and atomic number	A1(TBq)	A1(Ci)	A2(TBq)	A2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Se-75	Selenium(34)	3	81.1	3	81.1	5.4x10 ²	1.5x10 ⁴
Se-79		40	1080	2	54.1	2.6x10 ⁻³	7.0x10 ⁻²
Si-31	Silicon(14)	0.6	16.2	0.5	13.5	1.4x10 ⁶	3.9x10 ⁷
Si-32		40	10800	0.2	5.41	3.9	1.1x10 ²
Sm-145	Samarium(62)	20	541	20	541	9.8x10 ¹	2.610 ³
Sm-147		Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	8.510 ⁻¹⁰
2.310 ⁻⁸	ted	ted		ed			
Sm-151		40	1080	4	108	9.710 ⁻¹	2.6x10 ¹
Sm-153		4	108	0.5	13.5	1.6x10 ⁴	4.4x10 ⁵
Sn-113	Tin(50)	4	108	4	108	3.7x10 ²	1.0x10 ⁴
Sn-117m		6	162	2	54.1	3.0x10 ³	8.2x10 ⁴
Sn-119m		40	1080	40	1080	1.4x10 ²	3.7x10 ³
Sn-121m		40	1080	0.9	24.3	2.0	5.4x10 ¹
Sn-123		0.6	16.2	0.5	13.5	3.0x10 ²	8.2x10 ³

Sn-125	0.2	5.41	0.2	5.41	4.0x10 ³	1.1x10 ⁵		
Sn-126	0.3	8.11	0.3	8.11	1.010-3	2.810-2		
Sr-82 Strontium(38)	0.2	5.41	0.2	5.41	2.3x10 ³	6.2x10 ⁴		
Sr-85m	5	135	5	135	1.2x10 ⁶	3.3x10 ⁷		
Sr-85	2	54.1	2	54.1	8.8x10 ²	2.4x10 ⁴		
Sr-87m	3	81.1	3	81.1	4.8x10 ⁵	1.3x10 ⁷		
Sr-89	0.6	16.2	0.5	13.5	1.1x10 ³	2.9x10 ⁴		
Sr-90	0.2	5.41	0.1	2.70	5.1	1.4x10 ²		
Sr-91	0.3	8.11	0.3	8.11	1.3x10 ⁵	3.6x10 ⁶		
Sr-92	0.8	21.6	0.5	13.5	4.7x10 ⁵	1.3x10 ⁷		
T Tritium(1)	40	1080	40	1080	3.6x10 ²	9.7x10 ³		
Ta-178Tantalum(73)	1	27.0	1	27.0	4.2x10 ⁶	1.1x10 ⁸		
Ta-179	30	811	30	811	4.1x10 ¹	1.1x10 ³		
Ta-182	0.8	21.6	0.5	13.5	2.3x10 ²	6.2x10 ³		
Tb-157Terbium(65)	40	1080	10	270	5.610-1	1.5x10 ¹		
Tb-158	1	27.0	0.7	18.9	5.610-1	1.5x10 ⁴		
Tb-160	0.9	24.3	0.5	13.5	4.2x10 ²	1.1x10 ⁴		
Tc-95m 2.2x10-4	Technetium(43)			2	54.1	2	54.1	8.3x10 ²
Tc-96m	0.4	10.8	0.4	10.8	1.4x10 ⁶	3.8x10 ⁷		
Tc-96	0.4	10.8	0.4	10.8	1.2x10 ⁴	3.2x10 ⁵		
Tc-97m	40	1080	40	1080	5.6x10 ²	1.5x10 ⁴		
Tc-97 1.4x10-3	Unlimi ted	Unlimi ted	Unlimited ed	Unlimit	5.2x10-5			

Tc-98	0.7	18.9	0.7	18.9	3.2x10 ⁻⁵	8.7x10 ⁻⁴
Tc-99m		8	216	8	216	1.9x10 ⁵ 5.3x10 ⁶
Tc-99	40	1080	0.9	24.3	6.3x10 ⁻⁴	1.7x10 ⁻²
Te-118Tellurium(52)	0.2	5.41	0.2	5.41	6.8x10 ³	1.8x10 ⁵
Te-121m		5	135	5	135	2.6x10 ² 7.0x10 ³
Te-121	2	54.1	2	54.1	2.4x10 ³	6.4x10 ⁴
Te-123m		7	189	7	189	3.3x10 ² 8.9x10 ³
Te-125m		30	811	9	243	6.7x10 ² 1.8x10 ⁴
Te-127m		20	541	0.5	13.5	3.5x10 ² 9.4x10 ³

Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES

(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TB A1(Ci) q)	A2(TBq) (TBq/g)	A2(Ci) Specific Activity (Ci/g)
Te-127	20 541	0.5 13.5	9.8x10 ⁴	2.6x10 ⁶
Te-129m	0.6 16.2	0.5 13.5	1.1x10 ³	3.0x10 ⁴
Te-129	0.6 16.2	0.5 13.5	7.7x10 ⁵	2.1x10 ⁷
Te-131m	0.7 18.9	0.5 13.5	3.0x10 ⁴	8.0x10 ⁵
Te-132	0.4 10.8	0.4 10.8	1.1x10 ⁴	3.0x10 ⁵
Th-227Thorium(90)	9 243	1x10 ⁻² 0.270	1.1x10 ³	3.1x10 ⁴
Th-228	0.3 8.11	4x10 ⁻⁴ 1.08x10 ⁻²	3.0x10 ¹	8.2x10 ²

	ted	ed	ed				
U-236	10	270	1x10-3	2.70x10-2	2.4x10-6	6.5x10-5	
U-238	Unlimi	Unlimit		Unlimit	Unlimited	1.2x10-8	
3.4x10-7	ted	ed	ed				
U (natural)		Unlimi	Unlimit	Unlimit	Unlimited		
2.6x10-8	7.1x10-7	ted	ed	ed			
U (enriched)		Unlimi	Unlimit	Unlimit	Unlimited	----	
(see	ted	ed	ed		§173.43		
					4£5%)		
U (enriched)	10	270	1x10-3	2.70x10-2	----	(see 49	
					CFR		
					173.434		
					35%)		
U (depleted)		Unlimi	Unlimit	Unlimit	Unlimited	----	
(see 49	ted	ed	ed		CFR		
					173.434)		
V-48 Vanadium(23)	0.3	8.11	0.3	8.11	6.3x103	1.7x105	
V-49	40	1080	40	1080	3.0x102	8.1x103	
W-178 Tungsten(74)	1	27.0	1	27.0	1.3x10-3	3.4x104	
W-181	30	811	30	811	2.2x102	6.0x103	
W-185	40	1080	0.9	24.3	3.5x102	9.4x103	
W-187	2	54.1	0.5	13.5	2.6x104	7.0x105	
W-188	0.2	5.41	0.2	5.41	3.7x102	1.0x104	
Xe-122 Xenon(54)	0.2	5.41	0.2	5.41	4.8x104	1.3x105	
Xe-123	0.2	5.41	0.2	5.41	4.4x105	1.2x107	
Xe-127	4	108	4	108	1.0x103	2.8x104	

Xe-131m	40	1080	40	1080	3.4x10 ³	8.4x10 ⁴
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Table A-1 (cont'd)

A1 AND A2 VALUES FOR RADIONUCLIDES
(See Footnotes at end of Table)

Symbol of Specific radionuclide Activity	Element and atomic number	A1(TBq)	A1(Ci)	A2(TBq)	A2(Ci)	Specific Activity
			q)	(TBq/g)	(Ci/g)	
Xe-133	20	541	20	541	6.9x10 ³	1.9x10 ⁵
Xe-135	1	108	4	108	9.5x10 ⁴	2.6x10 ⁶
Y-87	Yttrium(39)	2	54.1	2	54.1	1.7x10 ⁴ 4.5x10 ⁵
Y-88	0.4	10.8	0.4	10.8	5.2x10 ²	1.4x10 ⁴
Y-90	0.2	5.41	0.2	5.41	2.0x10 ⁴	5.4x10 ⁵
Y-91m	2	54.1	2	54.1	1.5x10 ⁶	4.2x10 ⁷
Y-91	0.3	8.11	0.3	8.11	9.1x10 ²	2.5x10 ⁴
Y-92	0.2	5.41	0.2	5.41	3.6x10 ⁵	9.6x10 ⁶
Y-93	0.2	5.41	0.2	5.41	1.2x10 ⁵	3.3x10 ⁶
Yb-169 2.4x10 ⁴	Ytterbium(70)	3	81.1	3	81.1	8.9x10 ²
Yb-175	30	811	0.9	24.3	6.6x10 ³	1.8x10 ⁵
Zn-65	Zinc(30)	2	54.1	2	54.1	3.0x10 ² 8.2x10 ³
Zn-69m	2	54.1	0.5	13.5	1.2x10 ⁵	3.3x10 ⁶
Zn-69	4	108	0.5	13.5	1.8x10 ⁶	4.9x10 ⁷
Zr-88	Zirconium(40)	3	81.1	3	81.1	6.6x10 ² 1.8x10 ⁴

0)

Zr-93	40	1080	0.2	5.41	9.3x10 ⁻⁵	2.5x10 ⁻³
Zr-95	1	27.0	0.9	24.3	7.9x10 ²	2.1x10 ⁴
Zr-97	0.3	8.11	0.3	8.11	7.1x10 ⁴	1.9x10 ⁶

aInternational shipments of Einsteinium require multilateral approval of A1 and A2 values.

bInternational shipments of Fermium require multilateral approval of A1 and A2 values.

c20 Ci for Mo99 for domestic use. MFP: For mixed fission products, use formula for mixtures or Table 10 in *173.433. Note: The activity per gram of radionuclide quantities are technical information that might not provide a direct relationship between the activity and total mass of material contained in a package.

Table A-2

GENERAL VALUES FOR A1 AND A2

Contents	A1		A2	
	(TBq)	(Ci)	(TBq)	(Ci)
Only beta- or gamma-emitting nuclides are known to be present.....	0.2	5	0.02	0.5
Alpha-emitting nuclides are known to be present, or no relevant data are available	0.10	2.70	2x10 ⁻⁵	5.41x10 ⁻⁴

Notes:

This section was repealed and re-enacted on April 26, 1999 as a matter of compatibility to conform to NRC regulations found in 10 CFR Part 71 governing packaging and transportation of radioactive material.

§175.201 Microwave Ovens.

(a) Applicability. The provisions of this Code relating to microwave ovens shall apply to such ovens sold, offered for sale, repaired or altered for use in homes, restaurants or other food vending establishments, hospitals or other medical care facilities, schools, and other establishments in the City where the public may be exposed.

(b) Definitions. As used in the sections of this Code relating to microwave ovens, the following definitions shall apply:

- (1) "Microwave oven" means a device designed to heat, cook or dry food through the application of electromagnetic energy at frequencies assigned by the Federal Communications Commission in the normal industrial, scientific and medical heating bands ranging from 890 megahertz to 6,000 megahertz.
- (2) "Cavity" means that portion of the microwave oven in which food may be heated, cooked or dried.
- (3) "Door" means the movable barrier which prevents access to the cavity during operation and whose function is to prevent emission of microwave energy from the passage or opening which provides access to the cavity.
- (4) "Safety interlock" means a device or system of devices which is intended to prevent generation of microwave energy when access to the cavity is possible.
- (5) "Service adjustments or service procedures" means those servicing methods prescribed by the manufacturer for a specific product model.
- (6) "Stirrer" means that feature of a microwave oven which is intended to provide uniform heating of the load by constantly changing the standing wave pattern within the cavity or moving the load.
- (7) "External surface" means the outside surface of the cabinet or enclosure provided by the manufacturer as part of the microwave oven, including doors, door handles, latches and control knobs.

(c) Requirements for microwave ovens.

(1) Power density limit. The power density of the microwave radiation emitted by a microwave oven shall not exceed 5 milliwatts (mW) per cm² at any point 5 cm (2 in) or more from the external surface of the oven except that a microwave oven offered for sale or sold by its manufacturer shall not have a power density exceeding 1 mW per cm² at any point 5 cm (2 in) or more from the external surface of the oven.

(2) Measurements and test conditions.

(i) Microwave ovens shall be in compliance with the power density limits if the maximum reading obtained at the location of greatest microwave radiation emission does not exceed the limits specified in this section when the emission is measured through at least one stirrer cycle.

(ii) The emission shall not exceed the requirements of §175.201(c)(1) when the microwave oven is operated at its maximum output and contains a load of 275 15 milliliters of tap water initially at 20 5 degrees Centigrade placed within the cavity at the center of the load-carrying surface provided by the manufacturer. The water container shall be a low form 600 milliliter beaker having an inside diameter of approximately 8.5 cm and made of an electrically non-conductive material such as glass or plastic.

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(iii) Measurements shall be made with the door fully closed as well as with the door fixed in any other position which allows the oven to operate.

(3) Door and safety interlocks.

(i) Microwave ovens manufactured prior to October 6, 1971 shall have one safety interlock.

(ii) Microwave ovens manufactured from October 6, 1971 through November 6, 1976:

(A) shall have a minimum of two operative safety interlocks, one of which shall be concealed. A concealed safety interlock on a fully assembled microwave oven must not be operable by any part of the body, or a rod 3 mm or greater in diameter and with a useful length of 10 cm. A magnetically operated interlock is considered to be concealed only if a test magnet, held in place on the oven by gravity or its own attraction, cannot operate the safety interlock. The test magnet shall have a pull at zero air gap of at least 4.5 kg and a pull at 1 cm air gap of at least 450 g when the face of the magnet which is toward the interlock switch when the magnet is in the test position is pulling against one of the large faces of a mild steel armature having dimensions of 80 mm by 50 mm by 8 mm.

(B) The insertion of an object into the oven cavity through any opening while the door is closed shall not cause microwave radiation emission from the oven to exceed the applicable power density limits specified in §175.201(c)(1).

(iii) For microwave ovens manufactured on or after August 4, 1974:

(A) One (the primary) required safety interlock shall prevent microwave radiation emission in excess of the requirement of §175.201(c)(1); the other (secondary) required safety interlock shall prevent microwave radiation emission in excess of 5 mW per cm² at any point 5 cm (2 in) or more from the external surface of the oven. The two required safety interlocks shall be designated as primary or secondary in the service instructions for the oven.

(B) A means of monitoring one or both of the required safety interlocks shall be provided which shall cause the oven to become inoperable and remain so until repaired if the required safety interlock(s) should fail to perform required functions as specified in this section. Interlock failures shall not disrupt the monitoring function.

(iv) Microwave ovens manufactured on and after November 7, 1976:

(A) shall have a minimum of two operative safety interlocks. At least one operative safety interlock on a fully assembled microwave oven shall not be operable by any part of the human body, or any object with a straight insertable length of 10 centimeters. Such interlock must also be concealed, unless its actuation is prevented when access to the interlock is possible. Any visible actuator or device to prevent actuation of this safety interlock must not be removable without disassembly of

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the oven or its door. A magnetically operated interlock is considered to be concealed, or its actuation is considered to be prevented, only if a test magnet held in place on the oven by gravity or its own attraction cannot operate the safety interlock. The test magnet shall be capable of lifting vertically at zero air gap at least 4.5 kilograms, and at 1 centimeter air gap at least 450 grams when the face of the magnet, which is toward the interlock when the magnet is in test position, is pulling against one of the large faces of a mild steel armature having dimensions of 80 millimeters by 50 millimeters by 8 millimeters.

(B) Microwave radiation emission from such ovens in excess of the limits specified in §175.201(c)(1) shall not be caused by insertion of an insulated wire through any opening in the external surfaces of a fully assembled oven into the cavity, waveguide, or other

microwave-energy-containing spaces while the door is closed, provided the wire, when inserted, could consist of two straight segments forming an obtuse angle of not less than 170 degrees.

(v) Failure of any single mechanical or electrical component of the microwave oven shall not cause all safety interlocks to be inoperative.

(vi) Service adjustments or service procedures on the microwave oven shall not cause the safety interlocks to become inoperative or the microwave radiation emission to exceed the power density limits of this section as a result of such service adjustments or procedures.

(4) Enforcement by the department, notice of repair and installation.

(i) Any microwave oven found deficient in meeting the provisions of §175.201(c) after survey by a Department representative shall be immediately taken out of service until such deficiencies have been corrected. The Bureau of Radiological Health shall be notified within 48 hours of the completion of such repairs.

(ii) Within 48 hours of an installation of a microwave oven in any restaurant or other food vending establishment, hospital or other medical care facility, school, or other establishment in the City where the public may be exposed, a notification of such installation shall be made to the Bureau of Radiological Health.

(e) User instructions.

(1) For microwave ovens manufactured prior to October 3, 1975 manufacturers thereof shall provide or cause to be provided, with each oven, adequate instructions for its safe use including clear warnings of precautions to be taken to avoid possible exposure to microwave radiation.

(2) For microwave ovens manufactured on or after October 3, 1975 manufacturers thereof shall provide or cause to be provided, with each oven, radiation safety instructions which:

(i) occupy a separate section and are an integral part of the regularly supplied user's manual and cookbook, if supplied separately, and are located so as to elicit the attention of the reader;

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(ii) are as legible and durable as other instructions with the title emphasized to elicit the attention of the reader by such means as bold-faced type, contrasting color, a heavy-lined border, or similar means; and

(iii) contain the following wording:

**“PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE
MICROWAVE ENERGY**

(A) Do not attempt to operate this oven with the door open since open-door operation can result in harmful exposure to microwave energy. It is important not to defeat or tamper with the safety interlocks.

(B) Do not place any object between the oven front face and the door or allow soil or cleaner residue to accumulate on sealing surfaces.

(C) Do not operate the oven if it is damaged. It is particularly important that the oven door close properly and that there is no damage to the:

(a) door (bent);

(b) hinges and latches (broken or loosened);

(c) door seals and sealing surfaces.

(D) The oven should not be adjusted or repaired by anyone except properly qualified service personnel.”

(f) Service instructions.

(1) For microwave ovens manufactured prior to October 3, 1975 manufacturers thereof shall provide or cause to be provided to servicing dealers and distributors and to others upon request, for each oven model, adequate instructions for service adjustment and service procedures including clear warnings of precautions to be taken to avoid possible exposure to microwave radiation.

(2) For microwave ovens manufactured on or after October 3, 1975 manufacturers thereof shall provide or cause to be provided to servicing dealers and distributors and to others upon request, for each oven model, adequate instruction for service adjustments and service procedures, and, in addition, radiation safety instructions which:

(i) occupy a separate section and are an integral part of the regularly supplied service manual and are located so as to elicit the attention of the reader;

(ii) are as legible and durable as other instructions with the title emphasized so as to elicit the attention of the reader by such means as bold-faced type, contrasting color, a heavy-lined border, or by similar means; and

(iii) contain the following wording:

“PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO
AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(A) Do not operate or allow the oven to be operated with the door open.

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(B) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:

(a) interlock operation;

(b) proper door closing;

(c) seal and sealing surfaces (arcing, wear, and other damage);

(d) damage to or loosening of hinges and latches;

(e) evidence of dropping or abuse.

(C) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, waveguide or transmission line, and cavity for proper alignment, integrity, and connections.

(D) Any defective or misadjusted components in the interlock monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted before the oven is released to the owner.

(E) A microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.”

(iv) Include additional radiation safety precautions or instructions which may be necessary for particular oven designs or models.

(g) Warning labels on microwave ovens.

(1) Microwave ovens manufactured on or after October 3, 1975 shall have the following warning labels:

(i) A label, permanently attached to or inscribed on the oven, which shall be legible and readily viewable during normal oven use, which shall have the title emphasized and be so

located as to elicit the attention of the user, and which shall bear the following warning statement: "PRECAUTIONS FOR SAFE USE TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

DO NOT Attempt to Operate This Oven With:

- (A) Object Caught in Door
- (B) Door That Does Not Close Properly
- (C) Damaged Door, Hinge, Latch, Sealing Surface"

(ii) A label permanently attached to or inscribed on the external surface of the oven which shall be legible and readily viewable during servicing and which shall have the word "CAUTION" emphasized and so located thereon as to elicit the attention of service personnel, and which shall bear the following warning statement:

"CAUTION: This Device is to be Serviced Only by Properly Qualified Service Personnel. Consult the Service Manual for Proper Service Procedures to Assure Continued Compliance with the Federal Performance Standard for Microwave Ovens and for Precautions to be Taken to Avoid Possible Exposure to Excessive Microwave Energy".

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(iii) The labels provided in accordance with §175.201(g)(1)(i) and (ii) shall bear only the statements specified therein, except for additional radiation safety warnings or instructions which may be necessary for particular oven designs or models.

(iv) A microwave oven model may be exempted from one or more of the radiation safety warnings specified in §175.201(g)(1)(I) based upon a determination pursuant to the federal Radiation Control for Health and Safety Act of 1968 and the regulations promulgated thereunder that such model would continue to comply with the standards contained in §175.201(c)(1), (2) and (3) under the adverse condition of use addressed by such precautionary statements.

§175.301 Television receivers and other electronic devices.

(a) No television receiver or other electronic device, whether used in the home or elsewhere, which emits radiation on application of high voltage, shall be offered, transferred or consigned for sale or use in the City of New York unless it is so constructed as to prevent radiation therefrom at a level greater than 1.29 E-7 C-kg-1 (0.5 milliroentgen per hour), measured five (5) cm (2 in) from any accessible surface and averaged over an area of 10 cm^2 (1.55 in²).

(b) No replacement part shall be offered, transferred or consigned for sale or use in the City of New York which on being installed could cause the assembled unit for which it is intended to exceed the radiation limit allowed under this section.

(c) No person shall alter or adjust any television receiver or other electronic device, whether used in the home or elsewhere, which can emit radiation in such manner as to increase the radiation emission level thereof, unless the level thereby achieved be within the emission limit allowed under this section.

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Article 181

Protection of Public Health Generally

Introductory Notes

Article 181 constitutes a revision of S.C. §§143, 213, 214, 221 and 338 dealing with diverse matters of environmental health and sanitation. Except for §181.15 on tattooing establishments, which is new, there are no major substantive changes. The Section Heading and text of Section 181.15 were repealed on September 15, 1997 to remove the ban on tattooing since such ban is no longer appropriate.

§181.01 Definitions.

- In this article (a) public transportation facility is used as defined in §139.01,
(b) commercial premises is used as defined in §135.01,
(c) food establishment is used as defined in §81.03,
(d) day care service, school and children's institutions are used as defined in §45.01, and
(e) hotel, rooming house and lodging house are used as defined in Multiple Dwelling Law §4.

Notes:

This section is new.

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§181.03 Spitting prohibited.

- (a) No person shall spit upon a sidewalk of a street or place, or on a floor, wall or stairway of any public or private building or premises used in common by the public, or in or on any public transportation facility.
(b) The owner or person in charge of a public transportation facility shall permanently and conspicuously post in each such place a sufficient number of notices prohibiting spitting.

Notes:

This section is derived from S.C. §213. The posting of signs prohibiting spitting is now required only for public transportation facilities. Under New York City Criminal Courts Act §102c, magistrates are empowered to try and punish violators of this section as and for an offense punishable by a fine of not more than \$25 or by imprisonment up to 10 days or both.

§181.05 Common towel prohibited.

No person who owns or is in charge of commercial premises, an office or other business establishment, day care service, school, children's institution, hotel, rooming house, lodging house, public wash room, public lavatory, public transportation facility or any other public place or any place used in common by the public shall furnish or maintain or permit the furnishing or maintenance of a common towel for the use of more than one person.

Notes:

This section is derived without substantive change from S.C. §214.

§181.07 Common eating and drinking utensils prohibited.

The use or furnishing for use of common eating or drinking utensils is prohibited in commercial premises, a public transportation facility, food establishment, hotel, rooming house, lodging house, day care service, school, children's institution, park, street or any other public place or any place used in common by the public.

Notes:

This section is derived without substantive change from S.C. §143.

§181.09 Manufacture and handling of cigars, cigarettes and tobacco.

(a) No person engaged in the preparation, manufacture, sorting or handling of cigars, cigarettes or tobacco intended for sale shall at any time:

(1) Touch such cigar, cigarette or tobacco with his lips, teeth or tongue; or,
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(2) Moisten such cigar, cigarette or tobacco with saliva, directly or indirectly, by spitting or by use of the fingers or utensils or accessories of any kind; or,

(3) Spray or moisten such cigar, cigarette or tobacco with water or any other liquid emitted from the mouth; or,

(4) Permit such cigar, cigarette or tobacco to touch or be introduced into the nose of any person.

(b) A person engaged in the preparation, manufacture, sorting or handling of cigars, cigarettes or tobacco intended for sale shall thoroughly wash his hands with soap and warm water before beginning work, immediately after each visit to the toilet, and at all other times when necessary during the course of the work.

(c) A copy of this section shall be posted conspicuously in every place where cigars, cigarettes or tobacco are prepared, manufactured, sorted or handled.

Notes:

This section is derived from S.C. §338. Subsection (b) is new.

§181.11 Growing of poison ivy and ragweed prohibited.

No person who owns, occupies or is in charge of a lot or premises shall cause or allow poison ivy, ragweed, or other poisonous or allergenic weed to grow on such lot or premises.

Notes:

This section is derived from S.C. §221. S.C. §221 prohibited the growth of poison ivy, ragweed, etc., in such a manner that it encroached on or its seed was carried into a public place; the instant section prohibits a person from growing or permitting these plants to grow on property he owns, occupies or of which he is in charge. Public Health Law §§1320 and 1321 deal with the powers and duties of local boards of health with respect to noxious weeds and growths Public Health Law §1321(4) also authorizes local legislative bodies, such as the Board of Health (see Charter §558), to enact additional legislation on the subject. In New York City eradication of these poisonous or deleterious growths is the method best calculated to protect the public from their harmful effects. This section aims at such eventual eradication.

§181.17 Smoking prohibited in certain areas.

(a) It shall be unlawful for any person to smoke or carry a lighted cigar, cigarette or pipe in any elevator or in any retail food establishment commonly known as a supermarket.

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(b) It shall be unlawful for any person to smoke or carry a lighted cigar, cigarette or pipe in any classroom or in any lecture hall, except that the owner or person in charge of such classroom or lecture hall may designate a special area or areas where smoking is permitted, unless otherwise prohibited by the Fire Department or by other law. The area or areas where smoking is permitted shall contain not more than 20% of the total seats of the classroom or lecture hall.

(c) It shall be unlawful, except as provided in subsection (e), for any person to smoke or carry a lighted cigar, cigarette or pipe in any theatre, motion picture theatre, opera house, concert hall, hospital, sanatorium, nursing home, convalescent home, home for the aged or chronically ill patients, museum or library.

(d) It shall be unlawful, except as provided in subsection (e), to smoke or carry a lighted cigar, cigarette or pipe in any enclosed public space in which 50 or more persons gather for religious, recreational, political or social purpose. This subsection shall not apply to:

(1) Any place in which social functions such as weddings, parties, testimonial dinners and similar functions are held and in which the seating arrangements are under the control of the sponsor of the function and not of the owner or person in charge of such place.

(2) Any establishment which sells admission tickets on a seasonal or other periodic basis.

(e) The owner or person in charge of any building, structure or place specified in subsections (c) and (d) may designate special areas therein where smoking is permitted unless otherwise prohibited by the Fire Department or by other law.

(f) Signs prohibiting or permitting smoking, as the case may be, shall be posted conspicuously by the owner or person in charge of each building, structure or place specified in subsections (a), (b), (c) and (d).

Notes:

This section is new. It was added by resolution adopted on July 25, 1974. Smoking is already prohibited by various provisions of the New York City Administrative Code, e.g., §§C19-165.1, C19-165.2 and C19-165.4. It is apparent that those provisions are fire prevention measures, whereas the basis for this section is the protection of the health and comfort of non-smokers. This difference in objective accounts for any divergencies between those sections and this section. It should be noted that smoking may not be permitted in designated areas if prohibited by the Fire Department or by other law. (See §139.07 of this Code which prohibits smoking in public transportation facilities.)

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Title V

Vital Statistics

Introductory Notes

Title V of the New York City Health Code contains provisions for the reporting of vital events, that is, births, fetal deaths and deaths in the City of New York. The title also contains the requirements for the disposal of human remains.

The provisions of this title are authorized by §567 of the City Charter:

The Board of Health shall prescribe the persons who shall be required to keep a registry of births, fetal deaths and deaths occurring in the City and file certificates thereof with the department and the form and manner in which such registry shall be kept and certificates filed. The Board of Health shall make rules for the recording of births which have not been recorded in accordance with law and for the change or alteration of any birth, fetal death or death certificate upon proof satisfactory to the commissioner.

The analysis of mortality and morbidity statistics is an important tool of modern public health administration. The study of reports of births, fetal deaths and deaths under this title, and of reports of disease under Title II of this Code, supply continuous information

to measure the state of health of the people of the City of New York, to measure the effectiveness of the Department of Health, and to indicate the need for existing or new public health programs.

The reporting of vital events not only plays an important part in the regulation of public health, but also serves the need for the creation and preservation of personal records of births and deaths. There is a need for records of birth as a means of proving such matters as identity or citizenship, and for records of death to determine such matters as rights to inheritance or succession.

Title V covers the subject matter of Article III of the Sanitary Code, Birth, Fetal Deaths and Deaths (S.C. §§31-36, 38-46); S.C. §350, Births and Deaths on Vessels and Aircrafts; Duty of Officers, Physicians and Others to Report; General Regulations of the Board of Health Relating to S.C. §§31 to 45; Rules of the Board of Health Governing the Change or Alteration of Any Birth, Stillbirth (Fetal Death) or Death Certificate; Rules of the Board of Health Governing the Recording of Births Which Have Not Been Recorded In Accordance

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With Law; and Rules of the Board of Health Governing the Charging of Fees for Searches and the Furnishing of Certifications of Birth Records, Certified Copies of Birth, Marriage and Death Records, Reports of Sanitary Violations, or Condemnation Certificates. The revision presents no major substantive changes but rather consolidates the many scattered code provisions, regulations, and Rules of the Board, in a unified code which reflects current practice in the administration of the vital statistics field; the revision also eliminates much obsolete detail. In addition, the revision extends the reporting period within which certain vital events must be reported, and clarifies the respective duties of those required to prepare reports and to file certificates. The revision also clarifies some of the provisions relating to the performance of autopsies. Provisions omitted in this revision include requirements contained in the Sanitary Code concerning notification to the office of the Chief Medical Examiner when unusual deaths or fetal deaths occur, which merely duplicated provisions of the Administrative Code, §§878-1.0 and 878-2.0. S.C. §36 relating to the making of false or misleading statements is omitted from this title but has been incorporated in §3.19. The resolution of the Board of Health relating to S.C. §31, concerning the reporting of births when the City is under enemy attack, has been included in the section providing for general emergency powers of the Commissioner of Health (§3.01 (c)). S.C. §42a relating to special requirements in disposing of the remains of a person who has died of smallpox has been omitted.

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Article 201

Births

Introductory Notes

This article contains provisions for the reporting of births occurring in the City, for the maintenance of registries of births and for the reporting of births not reported at the time of the event.

§201.01 Definitions.

When used in this title:

(a) Live birth or birth means the complete expulsion or extraction from its mother of a product of conception, regardless of the duration of pregnancy, which after expulsion or extraction shows evidence of life, such as breathing, beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached.

(b) Person in charge of a hospital means the officer or employee who is responsible for the administration of a hospital or similar institution and includes but is not limited to a person holding the title of administrator, superintendent, director or executive director.

Notes:

Subsection (a), live birth or birth, is derived from S.C. §31(a). The definition follows the 1950 World Health Organization (WHO) definition of "live birth", as contained in International Recommendations on Definitions of Live Birth and Fetal Death. P.H.S. Pub. No. 39 (National Office of Vital Statistics, October, 1950, page 6). The WHO definition, except for its inclusion of "pulsation of the umbilical cord" as an additional sign of life, does not substantially differ from S.C. §31(a).

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Subsection (b), person in charge of a hospital, is new. Since administrative heads of hospitals in New York City have various titles, the term "person in charge of a hospital" must be broadly defined. The term "superintendent" was previously used without definition in S.C. §§31(b) and (f).

§175.02 Definitions.

(a) As used in this Code, the following definitions shall apply:

- (1) "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 LSA and SCO material, permitted in a Type A package. These values are either listed in Table A-1, Appendix A of §175.105 of this Code or may be derived in accordance with the procedure prescribed in such Appendix A.
- (2) "Absorbed dose" means the energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the gray (Gy) and the rad.
- (3) "Accelerator" means any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of 1 MeV. For purposes of this definition, "particle accelerator" is an equivalent term.
- (4) "Accelerator-produced material" means any material made radioactive by a particle accelerator.
- (5) "Accessible surface" means the external surface of the enclosure or housing provided by the manufacturer.
- (6) "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).
- (7) "Added filtration" means any filtration which is in addition to the inherent filtration.
- (8) "Adult" means an individual 18 or more years of age.
- (9) "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).
- (10) "Airborne radioactive material" means any radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

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- (11) "Airborne radioactivity area" means a room, enclosure, or area in which airborne radioactive materials exist in concentrations:
 - (i) in excess of the derived air concentrations (DACs) specified in Table 1, Appendix B of §175.03 of this Code, or
 - (ii) to such a degree that an individual present in the area without respiratory protective equipment 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.
- (12) "Aluminum equivalent" means the thickness of aluminum (type 1100 alloy) affording the same attenuation, under specified conditions, as the material in question. The nominal chemical composition of type 1100 aluminum alloy is 99.00 percent minimum aluminum, 0.12 percent copper.
- (13) "Annual limit on intake" (ALI) means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 0.05 Sv (5 rem) or a committed dose equivalent of 0.5 Sv (50 rem) to any individual organ or tissue. ALI

values for intake by ingestion and by inhalation of selected radionuclides are given in Table 1, Columns 1 and 2, of Appendix B of §175.03 of this Code.

(14) "Area of use" means a portion of a physical structure, or a specified out-of-doors location, that has been set aside for the purpose of receiving, producing, using, or storing radioactive material.

(15) "As low as is reasonably achievable" (ALARA) means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this Code 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.

(16) "Assembler" means any person engaged in the business of assembling, replacing, or installing one or more components into an x-ray system or subsystem. The term includes the owner of an x-ray system or such person's employee or agent who assembles components into an x-ray system that is subsequently used to provide professional or commercial services.

(17) "Attenuation block" means a block or stack, having dimensions 20 centimeters by 20 centimeters by 3.8 centimeters (8 inches by 8 inches by 1.5 inches), of type 1100 aluminum alloy or other materials having equivalent attenuation.

(18) "Authorized user" means an individual who is identified as an authorized user on a Department, Agreement State, or U.S. Nuclear Regulatory Commission license that authorizes the use of radioactive material

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or who is named as an authorized user on a certified registration issued by the Department.

(19) "Automatic exposure control" means a device which automatically controls one or more technique factors in order to obtain a required quantity of radiation at a preselected location(s).

(20) "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. "Background radiation" does not include radiation from any regulated sources of radiation.

(21) "Barrier" [see "Protective Barrier"].

(22) "Beam axis" means a line from the source through the centers of the x-ray fields.

(23) "Beam-limiting device" means a device which provides a means to restrict the dimensions of the x-ray beam.

(24) "Beam monitoring system" means a system designed to detect and measure the radiation present in the useful beam.

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

(26) "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 this Code, "radiobioassay" is an equivalent term.

(27) "Brachytherapy" means a method of radiation therapy in which sealed sources are utilized to deliver a radiation dose at a distance of up to a few centimeters, by surface, intracavitary, or interstitial application. Brachytherapy includes radiation therapy using electronic remote afterloading devices.

(28) "Breast equivalent phantom" means a device which contains test objects of various specified dimensions as speck sets, masses and fibers representing low density areas and microcalcifications related to the imaging of breast lesions and which can be imaged by a mammographic x-ray system to visualize such test objects.

(29) "Byproduct material" means:

(i) 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

(ii) 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

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by these solution extraction operations do not constitute "byproduct material" within this definition.

(30) "Calendar quarter" means not less than 12 consecutive weeks nor more than 14 consecutive weeks. The first calendar quarter of each year shall begin in January and subsequent calendar quarters shall be so arranged such that no day is included in more than one calendar quarter and no day in any one year is omitted from inclusion within a calendar quarter. No licensee or registrant shall change the method observed by him/her of determining calendar quarters for purposes of this Code except at the beginning of a year.

(31) "Calibration" means the determination of:

(i) the response or reading of an instrument relative to a series of known radiation values over the range of the instrument, or

(ii) the strength of a source of radiation relative to a standard.

(32) "C-arm x-ray system" means an x-ray system in which the image receptor and x-ray tube housing assembly are connected by a common mechanical support system in order to maintain a desired spatial relationship. This system is designed to allow a change in the projection of the beam through the patient without a change in the position of the patient.

(33) "Carrier" means a person engaged in the transportation of passengers or property by land or water as a common, contract, or private carrier, or by civil aircraft.

(34) "Certified components" means components of x-ray systems which are subject to regulations promulgated under Public Law 90-602, the Radiation Control for Health and Safety Act of 1968.

(35) "Certified registration" means a registration for any therapeutic radiation machine issued by the Department upon review and approval of an application submitted pursuant to this Code.

(36) "Certified system" means any x-ray system which has one or more certified components.

(37) "Certified Radiation Equipment Safety Officer" means an individual who holds an unexpired certificate as a radiation equipment safety officer issued by the New York State Department of Health.

(38) "CFR" means Code of Federal Regulations.

(39) "Chelating agent" means amine polycarboxylic acids, hydroxycarboxylic acids, gluconic acid, and polycarboxylic acids.

(40) "City" means the City of New York.

(41) "Class" means a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which applies to a range of clearance half-times: for Class D, Days, of less than 10 days; for Class W, Weeks, from 10 to 100 days; and for Class Y, Years, of greater than 100 days. For purposes of this Code, "lung class" and "inhalation class" are equivalent terms.

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(42) "Coefficient of Variation," or "C" means the ratio of the standard deviation to the mean value of a population of observations. It is estimated using the following equation:

where

s = estimated standard deviation of the population.

X = mean value of observations in sample.

X_i = ith observation in sample.

n = number of observations in sample.

(43) "Collective dose" means the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

(44) "Collimator" means a device by which a radiation beam is restricted in size.

(45) "Commissioner" means the Commissioner of Health of the City of New York.

(46) "Committed dose equivalent" (HT,50) means the dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

(47) "Committed effective dose equivalent" (HE, 50) is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to each of these organs or tissues ($HE,50 = \sum w_T HT,50$).

(48) "Computed tomography" or "CT" means the production of a tomogram by the acquisition and computer processing of x-ray transmission data.

(49) "Cone" means a device used to indicate beam direction and to establish a minimum source-surface distance. It may or may not incorporate a collimator.

(50) "Contamination" means the presence in or on any animal, food, water supply, building or premises, body of water, municipal sewage disposal system, chattel or thing of a solid, liquid or gas emitting ionizing radiation which may constitute a danger to human beings.

(51) "Control panel" means that part of radiation equipment upon which is mounted the switches, knobs, pushbuttons, and other hardware necessary for manually setting the technique factors.

(52) "Conveyance" means:

- (1) "For transport by public highway or rail" any transport vehicle or large freight container;
- (2) "For transport by water" any vessel, or any hold, compartment, or defined deck area of a vessel including any transport vehicle on board the vessel; and
- (3) "For transport by aircraft" any aircraft.

(53) "Cooling curve" means the graphical relationship between heat units stored and cooling time.

(54) "Curie" means a unit of activity. One curie (Ci) is that quantity of radioactive material which decays at the rate of $3.7E+10$ transformations per second (t-s-1).

(55) "Dead-man switch" means a switch so constructed that a circuit-closing contact can be maintained only by continuous pressure on the switch by the operator.

(56) "Declared pregnant woman" means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

(57) "Dedicated check source" means a radiation source that is used to assure the constant operation of a radiation detection or measurement device over several months or years.

(58) "Deep dose equivalent" (Hd), which applies to external whole body exposure, means the dose equivalent at a tissue depth of 1 centimeter (1000 mg/cm²).

(59) "Department" means the New York City Department of Health.

(60) "Depleted uranium" means the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present.

(61) "Derived air concentration" (DAC) means the concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work, results in an intake of one ALI. For purposes of this Code, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in Table 1, Column 3, of Appendix B of §175.03 of this Code.

(62) "Derived air concentration-hour" (DAC-hour) means the product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration for each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee or registrant may take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of 0.05 Sv (5 rem).

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(63) "Deterministic effect" [see "Nonstochastic effect"].

(64) "Diagnostic source assembly" means the tube housing assembly with a beam-limiting device attached.

(65) "Diagnostic type protective tube housing" means an x-ray tube housing so constructed that the leakage radiation at a distance of one meter from the tube housing does not exceed $2.58 E-5 C\text{-kg-1}$ (100 milliroentgens) in one hour with a beam-limiting device attached and the tube operated at its leakage technique factors as specified by the manufacturer. Measurements may be averaged over an area of 100 cm² with no linear dimensions greater than 20 centimeters (8 inches).

- (66) "Diagnostic x-ray system" means an x-ray system designed for irradiation of any part of the human body for the purpose of diagnosis or visualization.
- (67) "Diaphragm" means a device or mechanism by which the radiation beam is restricted in size.
- (68) "Dose" is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, total organ dose equivalent, or total effective dose equivalent. For purposes of this Code, "radiation dose" is an equivalent term.
- (69) "Dose equivalent (HT)" means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the sievert (Sv) and rem.
- (70) "Dose limits" means the permissible upper bounds of radiation doses established in accordance with this Code. For purposes of this Code, "limits" is an equivalent term.
- (71) "Dose monitor unit" [See "Monitor unit".]
- (72) "Dosimetry processor" means an individual or an organization that processes and evaluates individual monitoring devices in order to determine the radiation dose delivered to the monitoring devices.
- (73) "Effective dose equivalent (HE)" means the sum of the products of the dose equivalent to each organ or tissue (HT) and the weighting factor (wT) applicable to each of the body organs or tissues that are irradiated ($HE = \sum wTHT$).
- (74) "Embryo/fetus" means the developing human organism from conception until the time of birth.
- (75) "Entrance or access point" means any opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed or registered radioactive materials. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

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- (76) "Entrance exposure rate" means the exposure per unit time at the point where the center of the useful beam enters the patient. For the purposes of this definition, "exposure" is defined in §175.02(a)(80)(ii).
- (77) "Equipment" means x-ray equipment.
- (78) "Exclusive use" (also referred to in other regulations as "sole use" or "full load") means the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. The consignor and the carrier must ensure that any loading or unloading is performed by personnel having radiological training and resources appropriate for safe handling of the consignment. The consignor must issue specific instructions, in writing, for maintenance of exclusive use shipment controls, and include them with the shipping paper information provided to the carrier by the consignor.
- (79) "Explosive material" means any chemical compound, mixture, or device which produces a substantial instantaneous release of gas and heat spontaneously or by contact with sparks or flame.
- (80) "Exposure" means either:
- (i) being exposed to ionizing radiation or to radioactive material; or

(ii) the quotient of dQ divided by dm where “ dQ ” is the absolute value of the total charge of the ions of one sign produced in air when all the electrons (negatrons and positrons) liberated by photons in a volume element of air having mass “ dm ” are completely stopped in air. The units of exposure are the coulomb per kilogram (C-kg-1) and the roentgen.

(81) “Exposure rate” means the exposure per unit of time.

(82) “External beam radiation therapy” means a method of radiation therapy utilized to deliver a radiation dose in which the source (sources) of radiation is (are) at a distance from the body. For the purposes of this Code “teletherapy” is an equivalent term.

(83) “External dose” means that portion of the dose equivalent received from any source of radiation outside the body.

(84) “Extremity” means hand, elbow, arm below the elbow, foot, knee, and leg below the knee.

(85) “Eye dose equivalent” means the external dose equivalent to the lens of the eye at a tissue depth of 0.3 centimeter (300 mg/cm²).

(86) “Field emission equipment” means equipment which uses an x-ray tube in which electron emission from the cathode is due solely to the action of an electric field.

(87) “Filter” means material placed in the useful beam to absorb preferentially selected radiations.

(88) [Reserved]

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(89) “Fissile material” means plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, or any combination of these radionuclides. Unirradiated natural uranium and depleted uranium, and natural uranium or depleted uranium that has been irradiated in thermal reactors only are not included in this definition. Certain exclusions from fissile material controls are provided in 10 CFR 71.53.

(90) “Fluoroscopic imaging assembly” means a subsystem in which x-ray photons produce a fluoroscopic image. It includes the image receptor(s) such as the image intensifier and spot-film device, electrical interlocks, if any, and structural material providing linkage between the image receptor and diagnostic source assembly.

(91) “Former U.S. Atomic Energy Commission (AEC) or U.S. Nuclear Regulatory Commission (NRC) licensed facilities” means nuclear reactors, nuclear fuel reprocessing plants, uranium enrichment plants, or critical mass experimental facilities where AEC or NRC licenses have been terminated.

(92) “Gantry” means that part of a radiation therapy system supporting and allowing movements of the radiation head about a center of rotation.

(93) “General purpose radiographic x-ray system” means any radiographic x-ray system which, by design, is not limited to radiographic examination of specific anatomical regions.

(94) “Generally applicable environmental radiation standards” means standards issued by the U.S. Environmental Protection Agency (EPA) under the authority of the Atomic Energy Act of 1954, as amended, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

(95) "Gonad or gonadal shield" means a protective barrier for the ovaries or testes.

(96) "Gray" (Gy) means the SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 joule per kilogram. One gray is equal to 100 rads.

(97) "Half-value layer (HVL)" means the thickness of specified material which, when introduced into the beam of a given path of radiation, reduces the exposure rate by one-half. In this definition, the contribution of all scattered radiation, other than any which might be present initially in the beam concerned, is deemed to be excluded.

(98) "Hazardous waste" means those wastes designated as hazardous by U.S. Environmental Protection Agency regulations in 40 CFR Part 261.

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(99) "High radiation area" means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 1 mSv (0.1 rem) in 1 hour at 30 centimeters (12 inches) from any source of radiation or from any surface that the radiation penetrates. For the purposes of this Code, rooms or areas in which diagnostic x-ray systems are used for healing arts purposes are not considered high radiation areas.

(100) "Human use" [see "Medical use"].

(101) "Image receptor" means any device, such as a fluorescent input phosphor or radiographic film, which transforms incident x-ray photons either into a visible image or into another form which can be made into a visible image by further transformation.

(102) "Individual" means any human being.

(103) "Individual monitoring" means the assessment of:

(i) dose equivalent

(A) by the use of individual monitoring devices, or

(B) by the use of survey data; or

(ii) committed effective dose equivalent

(A) by bioassay, or

(B) by determination of the time-weighted air concentrations to which an individual has been exposed, that is, DAC-hours.

(104) "Individual monitoring devices" means devices designed to be worn by a single individual for the assessment of dose equivalent. For purposes of this Code, "personnel dosimeter" and "dosimeter" are equivalent terms. Examples of individual monitoring devices are film badges, thermoluminescent dosimeters (TLDs), pocket ionization chambers, and personal air sampling devices.

(105) "Inhalation class" [see "Class"].

(106) "Inherent filtration" means the filtration of the useful beam provided by the permanently installed components of the tube housing assembly.

(107) "Inspection" means an official examination or observation including, but not limited to, tests, surveys, and monitoring to determine compliance with rules, regulations, orders, requirements, and conditions of the Department.

(108) "Interlock" means a device arranged or connected such that the occurrence of an event or condition is required before a second event or condition can occur or continue to occur.

(109) "Internal dose" means that portion of the dose equivalent received from radioactive material taken into the body.

(110) "Kilo electron volt (keV)" means the energy equal to that acquired by a particle with one electron charge in passing through a potential difference of one thousand volts in a vacuum.

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(111) "Kilovolt peak (kVp)" means the maximum value in kilovolts of the potential difference of a pulsating generator. When only one-half of the wave is used, the value refers to the useful half of the wave.

(112) "Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.

(113) "Leakage radiation" means radiation emanating from the diagnostic source assembly except for:

- (i) the useful beam, and
- (ii) radiation produced when the exposure switch or timer is not activated.

(114) "Leakage technique factors" means the technique factors associated with the diagnostic or therapeutic source assembly which are used in measuring leakage radiation. They are defined as follows:

(i) for diagnostic source assemblies intended for capacitor energy storage equipment, the maximum-rated peak tube potential and the maximum-rated number of exposures in an hour for operation at the maximum-rated peak tube potential with the quantity of charge per exposure being 10 millicoulombs, i.e., 10 milliampere seconds, or the minimum obtainable from the unit, whichever is larger.

(ii) for diagnostic source assemblies intended for field emission equipment rated for pulsed operation, the maximum-rated peak tube potential and the maximum-rated number of x-ray pulses in an hour for operation at the maximum-rated peak tube potential.

(iii) for all other diagnostic or therapeutic source assemblies, the maximum-rated peak tube potential and the maximum-rated continuous tube current for the maximum-rated peak tube potential.

(115) "License" means a radioactive materials license issued by the Department for the transfer, receipt, production, possession or use of radioactive materials pursuant to this Code. There are two types of licenses: general and specific. A "general license" means a license to transfer, receive, possess, or use radioactive material in certain forms or quantities which is issued pursuant to the terms and conditions of this Code. General licenses are effective without the filing of an application with or the issuance of a license document by the Department. A "specific license" means a license evidenced by a license document issued by the Department to a licensee upon review and approval of an application submitted pursuant to this Code or a license similarly issued by the New York State Department of Health, the New York State Department of Labor, the U.S. Nuclear Regulatory Commission or any agreement state. Unless otherwise specified, the type of license referred to in this Code shall be a specific license.

(116) "Licensed material" means [radioactive material] byproduct, source, or special nuclear material received, possessed, produced, used, transferred or disposed of under a general or specific license issued by the Department or any radioactive material which is subject to the licensure requirement of this Code.

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(117) "Licensee" means any person who is licensed by the Department in accordance with this Code or any person who possesses radioactive material which is subject to the licensure requirements of this Code.

(118) "Limits" [See "Dose limits"].

(119) "Light field" means the area illuminated by visible light, simulating the radiation field.

(120) "Linear accelerator" [See "Accelerator"]. For the purposes of this Code, "linac" is an equivalent term.

(121) "Line-voltage regulation" means the difference between the no-load line potentials expressed as a percent of the load line potential; that is,

Percent line-voltage regulation =

where:

Vn = No-load line potential and

Vl = Line load potential.

(122) "Lost or missing licensed material" means licensed radioactive material whose location is unknown. This definition includes licensed material that has been shipped but has not reached its planned destination and whose location cannot be readily traced in the transportation system.

(123) "Low specific activity (LSA) material" means radioactive material with limited specific activity that satisfies the descriptions and limits set forth below. Shielding materials surrounding the LSA material may not be considered in determining the estimated average specific activity of the package contents. LSA material must be in one of three groups:

(1) LSA-I.

(i) [Ores containing only naturally occurring radionuclides (e.g., uranium, thorium) and uranium or thorium concentrates of such ores; or] Uranium and thorium ores, concentrates of uranium and thorium ores, and other ores containing naturally occurring radioactive radionuclides which are not intended to be processed for the use of these radionuclides;

(ii) Solid unirradiated natural uranium or depleted uranium or natural thorium or their solid or liquid compounds or mixtures; [or]

(iii) Radioactive material for which the A2 value is unlimited; or

(iv) Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the value for exempt material activity concentration determined in accordance with Appendix A.

(2) LSA-II.

(i) Water with tritium concentration up to 0.8 TBq/liter (20.0 Ci/liter); or

(ii) Other material in which the activity is distributed throughout and the average specific activity does not exceed 10-4 A2/g for solids and gases, and 10-5 A2/g for liquids.

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(3) LSA-III. Solids (e.g., consolidated wastes, activated materials), excluding powders, in which

Deleted: other than fissile material,

Deleted: Mill tailings, contaminated earth, concrete, rubble, other debris, and activated material in which the radioactive material is essentially uniformly distributed, and the average specific activity does not exceed 10-6 A2/g.

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- (i) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);
- (ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of radioactive material per package by leaching, when placed in water for 7 days, would not exceed 0.1 A2; and

(iii) The estimated average specific activity of the solid does not exceed 2×10^{-3} A2/g.

(124) "Lung class" [see "Class"].

(125) "Major processor" means a user processing, handling, or manufacturing radioactive material exceeding Type A quantities as unsealed sources or material, or exceeding 4 times Type B quantities as sealed sources, but does not include nuclear medicine programs, universities, industrial radiographers, or small industrial programs.

(126) "Management" means the chief executive officer or that individual's designee or designees.

(127) "Maximum line current" means the root-mean-square current in the supply line of an x-ray machine operating at its maximum rating.

(128) "Medical institution" means a facility as defined in Article 28 of the New York State Public Health Law.

(129) "Medical misadministration" means the administration of:

- (i) a radiopharmaceutical, radiobiologic or radiation from a source other than the one ordered;
- (ii) a radiopharmaceutical, radiobiologic or radiation to the wrong person;
- (iii) a radiopharmaceutical, radiobiologic or radiation by a route of administration, or to a part of the body, other than that in the order of the prescribing physician;
- (iv) an activity of a diagnostic radiopharmaceutical or radiobiologic differing from the prescribed activity by more than 50 percent;
- (v) an activity of a therapeutic radiopharmaceutical or radiobiologic differing from the prescribed activity by more than 10 percent;
- (vi) a therapeutic radiation dose from any source other than a radiopharmaceutical, radiobiologic or brachytherapy source such that errors in computation, calibration, time of exposure, treatment geometry or equipment malfunction result in a calculated total treatment dose differing from the final prescribed total treatment dose ordered by more than 10 percent;

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(vii) a therapeutic radiation dose from a brachytherapy source such that errors in computation, calibration, treatment time, source activity, source placement or equipment malfunction result in a calculated total treatment dose differing from the final total treatment dose ordered by more than 10 percent; or

(viii) a therapeutic radiation dose in any fraction of a fractionated treatment such that the administered dose in the individual treatment or fraction differs from the dose ordered for that individual treatment or fraction by more than 50 percent.

(130) "Medical use" means the intentional internal or external administration of radiation to humans in the practice of the healing arts in accordance with a license issued by a State

or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico. For the purposes of this Code, "human use" is an equivalent term.

(131) "Mega electron volt (MeV)" means the energy equal to that acquired by a particle with one electron charge passing through a potential difference of one million volts in a vacuum.

(132) "Member of the public" means any individual, except an individual who is performing assigned duties for the licensee or registrant involving exposure to sources of radiation.

(133) "Minor" means an individual less than 18 years of age.

(134) "Monitor unit" means a unit response from the beam monitoring system from which the absorbed dose can be calculated. For the purposes of this Code, "Dose monitor unit" is an equivalent term.

(135) "Monitoring" means the measurement of radiation, radioactive material concentrations, surface area activities or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses. For purposes of this Code, "radiation monitoring" and "radiation protection monitoring" are equivalent terms.

(136) "NARM" means any naturally occurring or accelerator-produced radioactive material. It does not include byproduct, source, or special nuclear material.

(137) "Natural radioactivity" means radioactivity of naturally occurring nuclides.

(138) "Nonstochastic effect" means a health effect, the severity of which varies with the dose and for which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect. For purposes of this Code, "deterministic effect" is an equivalent term.

(139) "Normal form radioactive material" means radioactive material which has not been demonstrated to qualify as special form radioactive material.

(140) "Nuclear Regulatory Commission" (NRC) means the U.S. Nuclear Regulatory Commission or its duly authorized representatives.

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(141) "Occupational dose" means the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to sources of radiation, whether in the possession of the licensee, registrant, or other person.

Occupational dose does not include doses received: from background radiation, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the public.

(142) "Operator" means any person conducting the business or activities carried on within a radiation installation or having by law the administrative control of a radiation source whether as owner, lessee, contractor, user or otherwise.

(143) "Output" means the exposure rate, dose rate, or a quantity related in a known manner to these rates of ionizing radiation from an external beam therapy unit for a specified set of exposure conditions.

(144) "Package" means the packaging together with its radioactive contents as presented for transport.

(1) ~~Fissile material package or Type AF package, Type BF package, Type B(U) F package, or Type B(M)F package~~ means a fissile material packaging together with its fissile material contents.

(2) ~~“Type A package”~~ means a Type A packaging together with its radioactive contents. ~~A Type A package is defined and must comply with the DOT regulations in 49 CFR 173.11.~~

(3) ~~Type B package~~ means a Type B packaging together with its radioactive contents. On approval, a Type B package design is designated by NRC as B(U) unless the package has a maximum normal operating pressure of more than 700 kPa (100 lbs /in²) gauge or a pressure relief device that would allow the release of radioactive material to the environment under the tests specified in § 71.73 (hypothetical accident conditions), in which case it will receive a designation B(M). B(U) refers to the need for unilateral approval of international shipments; B(M) refers to the need for multilateral approval of international shipments. ~~There is no distinction made in how packages with these designations may be used in domestic transportation. To determine their distinction for international transportation, see DOT regulations in 49 CFR Part 173. A Type B package approved before September 6, 1983, was designated only Type B. Limitations on its use are specified in § 71.19.~~

(145) “Packaging” means the assembly of components necessary to ensure compliance with the packaging requirements of 10 CFR Part 71. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, tie-down system, and auxiliary equipment may be designated as part of the packaging.

(146) “Particle accelerator” [See “Accelerator”].

(147) “Peak tube potential” means the maximum value of the potential difference across the x-ray tube during an exposure.

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(148) “Person” means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, public authority or political subdivision of this State, any other State of the United States or political subdivision or agency thereof, and any legal successor, representative, agent or agency of the foregoing, but shall not include federal government agencies.

(149) “Personnel monitoring equipment” [See “Individual monitoring devices”].

(150) “Phantom” means an object behaving in essentially the same manner as tissue with respect to absorption or scattering of the ionizing radiation in question.

(151) “Planned special exposure” means an infrequent exposure to radiation, separate from and in addition to the annual occupational dose limits.

(152) “Position indicating device (PID)” means a device on dental x-ray equipment used to indicate the beam position and to establish a definite source-surface (skin) distance.

(153) “Positive collimating device” means a device which is permanently affixed to the x-ray tube housing and is intended to confine the emerging x-ray beam to the image receptor or area of clinical interest, whichever is smaller.

(154) “Primary protective barrier” [See “Protective barrier”].

(155) “Probabilistic effect” [See “Stochastic effect”].

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Deleted: approval of international shipments. There is no distinction made in how packages with these designations may be used in domestic transportation. To determine their distinction for international transportation, see USDOT regulations in 49 CFR Part 173. A Type B package approved before September 6, 1983, was designated only as Type B. Limitations on its use are specified in 10 CFR 71.13.

(156) "Professional practice" means the practice of medicine, dentistry, podiatry, osteopathy, chiropractic or veterinary medicine.

(157) "Professional practitioner" means any person licensed or otherwise authorized under the New York State Education Law to practice a professional practice.

(158) "Protective apron" means an apron made of radiation attenuating material(s), used to reduce radiation exposure.

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(159) "Protective barrier" means a barrier of radiation absorbing material(s) used to reduce radiation exposure. The types of protective barriers are as follows:

(i) "Primary protective barrier" means the material, excluding filters, placed in the useful beam, for protection purposes, to reduce the radiation exposure.

(ii) "Secondary protective barrier" means a barrier sufficient to attenuate the stray radiation to the required degree.

(160) "Protective glove" means a glove made of radiation attenuating material(s) used to reduce radiation exposure.

(161) "Public dose" means the dose received by a member of the public from exposure to sources of radiation. It does not include occupational dose, dose received from background radiation, dose received as a patient from medical practices, or dose from voluntary participation in medical research programs.

(162) "Pyrophoric liquid" means any liquid that ignites spontaneously in dry or moist air at or below 54.4°C (130°F). A pyrophoric solid is any solid material, other than one classed as an explosive, which under normal conditions is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and, when ignited, burns so vigorously and persistently as to create a serious transportation, handling, or disposal hazard. Included are spontaneously combustible and water-reactive materials.

(163) "Qualified expert" means an individual having the knowledge and training to measure ionizing radiation, to evaluate safety techniques, and to advise regarding radiation protection needs, e.g., individuals certified in the appropriate field by the American Board of Radiology or the American Board of Health Physics, or those having equivalent qualifications. With reference to the calibration of radiation therapy equipment, an individual having, in addition to the above qualifications, training and experience in the clinical applications of radiation physics to radiation therapy, e.g., individuals certified by the American Board of Medical Physics or in Therapeutic Radiological Physics or X-Ray and Radium Physics by the American Board of Radiology.

(164) "Quality factor" (Q) means the modifying factor that is used to derive dose equivalent from absorbed dose.

(i) As used in this Code, the quality factors for converting absorbed dose to dose equivalent are shown in Table 1.

(Table follows this page)

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TABLE 1

QUALITY FACTORS AND ABSORBED DOSE EQUIVALENTS

Absorbed Dose Equal to a
Quality Factor Unit Dose Equivalent^a
TYPE OF RADIATION (Q)

X, gamma, or beta radiation and high-speed electrons	1	1
Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge	20	0.05
Neutrons of unknown energy	10	0.1
High-energy protons	10	0.1

Foot Note a Absorbed dose in gray equal to 1 Sv or the absorbed dose in rad equal to 1 rem.

(ii) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in sievert per hour or rem per hour, as provided in Table 1, 0.01 Sv (1 rem) of neutron radiation of unknown energies may, for purposes of this Code, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee or registrant may use the fluence rate per unit dose equivalent or the appropriate Q value from Table 2 to convert a measured tissue dose in gray or rad to dose equivalent in sievert or rem.

TABLE 2

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

	Fluence per Unit Dose Equivalent ^b	
Neutron Energy (MeV)	(neutrons cm-2 Quality Factor (Q)	Fluence per Unit Dose Equivalent ^b
	(neutrons cm-2 Sv-1)	(neutrons cm-2 rem-1)

(thermal)	2.5E-8	2	980E+6	980E+8
	1E-7	2	980E+6	980E+8
	1E-6	2	810E+6	810E+8
	1E-5	2	810E+6	810E+8
	1E-4	2	840E+6	840E+8
	1E-3	2	980E+6	980E+8
	1E-2	2.5	1010E+6	1010E+8
	1E-1	7.5	170E+6	170E+8
	5E-1	11	39E+6	39E+8

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TABLE 2 (cont'd)

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

Neutron Energy (MeV)	Quality Factor (Q)	Fluence per Unit Dose Equivalent ^b	
		(neutrons cm ⁻² rem ⁻¹)	(neutrons cm ⁻² Sv ⁻¹)
(thermal)	1	11	27E+6 27E+8
	2.5	9	29E+6 29E+8
	5	8	23E+6 23E+8

7	7	24E+6	24E+8
10	6.5	24E+6	24E+8
14	7.5	17E+6	17E+8
20	8	16E+6	16E+8
40	7	14E+6	14E+8
60	5.5	16E+6	16E+8
1E+2	4	20E+6	20E+8
2E+2	3.5	19E+6	19E+8
3E+2	3.5	16E+6	16E+8
4E+2	3.5	14E+6	14E+8

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

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

(165) "Quarter" [See "Calendar quarter"].

(166) "Rad" means the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs per gram or 0.01 joule per kilogram (0.01 gray).

(167) "Radiation" means alpha particles, beta particles, gamma rays, x rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. For purposes of this Code, ionizing radiation is an equivalent term. Radiation, as used in this Code, does not include non-ionizing radiation, such as radiowaves or microwaves, visible, infrared, or ultraviolet light.

(168) "Radiation area" means any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.05 mSv (0.005 rem) in 1 hour at 30 centimeters (12 inches) from the source of radiation or from any surface that the radiation penetrates.

(169) "Radiation detector" means a device which in the presence of radiation provides a signal or other indication suitable for use in measuring one or more quantities of incident radiation.

(170) "Radiation dose" [See "Dose"].

(171) "Radiation equipment" means any equipment or device which can emit radiation by virtue of the application thereto of high voltage.

(172) "Radiation installation" means any place or facility, including vehicles such as a van or truck, where:

(i) radiation equipment, in operable condition or assembles and intended to be used, is located or used; or

(ii) radioactive material is transferred, received, produced, possessed or used.

Such installation shall include generally a hospital; medical, dental, chiropractic, osteopathic, podiatric, or veterinarian institution, clinic or office; van or truck providing services at non-permanent locations; educational institution; commercial, private or research laboratory performing diagnostic procedures or handling equipment or material for medical use; or any trucking, storage, messenger or delivery service establishment.

Radiation installation shall include, whether or not it is specifically stated above, any place, facility or vehicle such as a van or truck where radiation is applied intentionally to a human. The limits of the radiation installation shall be as designated by the operator.

(173) "Radiation machine" means any device capable of producing radiation except those devices with radioactive material as the only source of radiation.

(174) "Radiation safety officer" means an individual who, under the authorization of the operator of a radiation installation, administers a radiation protection program in accordance with §175.03 of this Code and who is qualified by training and experience in radiological health to evaluate the radiation hazards of such installation and administer such radiation protection program.

(175) "Radiation source" means any radioactive material or any radiation equipment.

(176) "Radiation therapy physicist" means the individual identified as the qualified radiation therapy physicist on a Department license or certified registration.

(177) "Radiation therapy simulation system" means a radiographic or fluoroscopic x-ray system intended for localizing the volume to be exposed during radiation therapy and confirming the position and size of the therapeutic irradiation field.

(178) "Radioactive material" means any solid, liquid, or gas which emits radiation spontaneously.

(179) "Radioactive material site" means a location, or contiguous and adjacent locations, under a single license in which radioactive materials are authorized to be received, produced, used, possessed (stored), or transferred

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and in which a specific use of said radioactive materials may be evaluated by a single set of Departmental inspection criteria concerning the procedures, equipment or shielding utilized by the licensee.

(180) "Radioactivity" means the transformation of unstable atomic nuclei by the emission of radiation.

(181) "Radiobioassay" [See "Bioassay".]

(182) "Rated line voltage" means the range of potentials, in volts, of the supply line specified by the manufacturer at which the x-ray machine is designed to operate.

(183) "Rated output current" means the maximum allowable load current of the x-ray high-voltage generator.

- (184) "Rated output voltage" means the allowable peak potential, in volts, at the output terminals of the x-ray high-voltage generator.
- (185) "Rating" means the operating limits specified by the manufacturer.
- (186) "Recording" means producing a permanent form of an image resulting from x-ray photons (e.g., film, video tape).
- (187) "Reference Man" means a hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base.
- (188) "Registrant" means any person who is registered with the Department or who is legally obligated to register with the Department pursuant to this Code.
- (189) "Registration" means registration with the Department in accordance with this Code.
- (190) "Rem" means the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. One rem is equal to 0.01 sievert.
- (191) "Research and development" means:
- (i) theoretical analysis, exploration, or experimentation; or
 - (ii) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes.
- Research and development does not include the internal or external administration of radiation or radioactive material to human beings.
- (192) "Respiratory protective equipment" means an apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials.

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- (193) "Response time" means the time required for an instrument system to reach 90 percent of its final reading when the radiation-sensitive volume of the instrument system is exposed to a step change in radiation flux from zero sufficient to provide a steady state midscale reading.
- (194) "Restricted area" means an area, access to which is limited by the licensee or registrant for the purpose of protecting individuals against undue risks from exposure to sources of radiation. A restricted area does not include any area used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.
- (195) "Roentgen" means the special unit of exposure. One roentgen (R) equals 2.58×10^{-4} coulomb per kilogram of air (see "Exposure").
- (196) "Sanitary sewerage" means a system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee or registrant.
- (197) "Scattered radiation" means radiation that, during passage through matter, has been deviated in direction. (The radiation also may have been modified by a decrease in energy.)
- (198) "Sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material

under the most severe conditions which are likely to be encountered in normal use and handling.

(199) "Secondary protective barrier" [See "Protective barrier"].

(200) "Shallow dose equivalent" (Hs), which applies to the external exposure of the skin or an extremity, means the dose equivalent at a tissue depth of 0.007 centimeter (7 mg/cm²) averaged over an area of 1 square centimeter.

(201) "Shutter" means a device attached to the tube housing assembly which can totally intercept the useful beam and which has a lead equivalency not less than that of the tube housing assembly.

(202) "SI" means the abbreviation for the International System of Units (Système Internationale).

(203) "Sievert" means the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sievert is equal to the absorbed dose in gray multiplied by the quality factor. One sievert is equal to 100 rem.

(204) "Site boundary" means that line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee or registrant.

(205) "Source" means, for the purposes of radiation equipment, the focal spot of the x-ray tube.

(206) "Source-image receptor distance (SID)" means the distance from the source to the center of the input surface of the image receptor.

(207) "Source material" means:

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(i) Uranium or thorium, or any combination thereof, in any physical or chemical form; or

(ii) Ores that contain by weight one-twentieth of 1 percent (0.05 percent) or more of uranium, thorium or any combination of uranium and thorium. Source material does not include special nuclear material.

(208) "Source material milling" means any activity that results in the production of byproduct material as defined in §175.02(a)(29)(ii).

(209) "Source of radiation" means any radioactive material or any device or equipment emitting, or capable of producing, radiation.

(210) "Source-skin distance or source-surface distance (SSD)" means the distance measured along the central ray from the center of the front surface of the source of the x-ray focal spot or sealed radioactive source to the surface of the irradiated object.

(211) "Special form radioactive material" means radioactive material which satisfies the following conditions:

(i) it is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

(ii) the piece or capsule has at least one dimension not less than 5 mm (0.197 inch); and

(iii) it satisfies the requirements of 10 CFR 71.75. A special form encapsulation designed in accordance with the requirements of 10 CFR 71.4 in effect on June 30, 1983, (see 10 CFR Part 71, revised as of January 1, 1983), and constructed prior to July 1, 1985, and a special form encapsulation designed in accordance with the requirements of 10 CFR 71.4 in effect on March 31, 1996, (see 10 CFR Part 71, revised as of January 1, 1983), and constructed before April 1, 1998, may continue to be used. Any other special form encapsulation must meet the specifications of this definition.

(212) "Special nuclear material" means:

- (i) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the U.S. Nuclear Regulatory Commission, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, as amended, determines to be special nuclear material, but does not include source material; or
- (ii) Any material artificially enriched by any of the foregoing, but does not include source material.

(213) "Special nuclear material in quantities not sufficient to form a critical mass" means uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235; uranium-233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams; or any combination of them in accordance with the following formula: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all of the

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kinds of special nuclear material in combination shall not exceed 1. For example, the following quantities in combination would not exceed the limitation and are within the formula:

$$\frac{175 \text{ (grams contained U-235)}}{350} + \frac{50 \text{ (grams U-233)}}{200} + \frac{50 \text{ (grams Pu)}}{200} = 1$$

(214) "Specific activity" of a radionuclide means the radioactivity of a radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.

(215) "State" means the State of New York, unless the context of this Code clearly indicates that a different meaning is intended.

(216) "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 this Code, "probabilistic effect" is an equivalent term.

(217) "Stray radiation" means the sum of leakage and scattered radiation.

(218) "Supervision" means

- (i) for radioactive materials licenses which do not authorize human use, the training of persons in the use of radioactive materials in other than medical procedures. Such training shall include at least thirty (30) hours of instruction in the principles and practices of radiation protection, radioactivity measurement, standardization and monitoring techniques and instruments, mathematics and calculations basic to the use and measurement of radioactivity, and biological effects of radiation; and

(ii) for radioactive materials licenses which do authorize human use, the training of a physician in the use of radioactive materials in the clinical treatment or diagnosis of disease. Such training shall provide that specified in §175.102(j), as applicable.

(219) "Survey" means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of sources of radiation. When appropriate, such evaluation includes, but is not limited to, tests, physical examinations, and measurements of levels of radiation or concentrations of radioactive material present.

(220) "Technique factors" means the conditions of operation of radiation equipment. They are specified as follows:

(i) For capacitor energy storage equipment, peak tube potential in kV and quantity of charge in mAs.

(ii) For field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses.

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(iii) For CT x-ray systems designed for pulsed operation, peak tube potential in kV, scan time in seconds, and either tube current in mA, x-ray pulse width in seconds, and the number of x-ray pulses per scan, or the product of tube current, x-ray pulse width, and the number of x-ray pulses in mAs;

(iv) For CT x-ray systems not designed for pulsed operation, peak tube potential in kV, and either tube current in mA and scan time in seconds, or the product of tube current and exposure time in mAs and the scan time when the scan time and exposure time are equivalent; and

(v) For all other equipment, peak tube potential in kV, and either tube current in mA and exposure time in seconds, or the product of tube current and exposure time in mAs.

(221) "Teletherapy" means a method of radiation therapy utilized to deliver a radiation dose in which the source (sources) of radiation is (are) at a distance from the body. For the purposes of this Code "external beam radiation therapy" is an equivalent term.

(222) "Test" means the process of verifying compliance with an applicable regulation.

(223) "Therapeutic-type protective tube housing" means:

(i) for x-ray therapy equipment not capable of operating at 500 kVp or above, the following definition applies: An x-ray tube housing so constructed that the leakage radiation averaged over any 100 cm² (15.5 inches²) at a distance of 1 meter (3 feet) from the source does not exceed 2.58 E-4 C-kg-1 (1 roentgen) in an hour when the tube is operated at its maximum rated continuous current for the maximum rated tube potential.

(ii) For x-ray therapy equipment capable of operation at 500 kVp or above, the following definition applies: An x-ray tube housing so constructed that the leakage radiation averaged over an 100 cm² (15.5 inches²) area at a distance of 1 meter (3 feet) from the source does not exceed 0.10 percent of the useful beam dose rate at 1 meter (3 feet) from the source for any of its operating conditions.

(224) "This Code" means Article 175 and all other parts of the New York City Health Code applicable to licensees and registrants or other persons subject to the provisions of Article 175.

(225) "Total effective dose equivalent" (TEDE) means the sum of the deep dose equivalent for external exposures and the committed effective dose equivalent for internal exposures.

(226) "Total organ dose equivalent" (TODE) means the sum of the deep dose equivalent and the committed dose equivalent to the organ receiving the highest dose as described in §175.03(k)(7)(i)(F) of this Code.

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(227) "Traceable to a national standard" means that a quantity or a measurement has been compared to a national standard directly or indirectly through one or more intermediate steps and that all comparisons have been documented.

(228) "Transport index" means the dimensionless number, rounded up to the next tenth, placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined as follows:

(1) For non-fissile material packages, the number determined by multiplying the maximum radiation level in millisievert (mSv) per hour at one meter (3.3 ft) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at one meter [3.3 ft]); or

(2) For fissile material packages, the number determined by multiplying the maximum radiation level in millisievert per hour at one meter (3.3 ft) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at one meter [3.3 ft]), or, for criticality control purposes, the number obtained as described in 10 CFR 71.59, whichever is larger.

(229) "Tube housing assembly" means the tube housing with tube installed. It includes high-voltage and/or filament transformers and other appropriate elements when they are contained within the tube housing.

(230) "Tube rating chart" means the set of curves which specify the rated limits of operation of the tube in terms of the technique factors.

(231) "Type A package" means a packaging that, together with its radioactive contents limited to A1 or A2 as appropriate, meets the requirements of U.S. DOT 49 CFR 173.410 and 173.412 and is designed to retain the integrity of containment and shielding required by this part under normal conditions of transport as demonstrated by the tests set forth in 49 CFR 173.465 or 173.466, as appropriate.

(232) "Type A quantity" means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A1 for special form radioactive material or A2 for normal form radioactive material. A1 and A2 are given in Appendix A of §175.105 or may be determined by procedures described in such Appendix A.

(233) [Reserved]

(234) [Reserved]

(235) "Type B quantity" means a quantity of radioactive material greater than a Type A quantity.

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(236) "U.S. Department of Energy" means the Department of Energy established by Public Law 95-91, August 4, 1977, 91 Stat. 565, 42 U.S.C. 7101 et seq., to the extent that the Department exercises functions formerly vested in the U.S. Atomic Energy

Commission, its Chairman, members, officers and components and transferred to the U.S. Energy Research and Development Administration and to the Administrator thereof pursuant to sections 104(b), (c) and (d) of the Energy Reorganization Act of 1974 (Public Law 93-438, October 11, 1974, 88 Stat. 1233 at 1237, 42 U.S.C. 5814, effective January 19, 1975) and retransferred to the Secretary of Energy pursuant to section 301(a) of the Department of Energy Organization Act (Public Law 95-91, August 4, 1977, 91 Stat. 565 at 577-578, 42 U.S.C. 7151, effective October 1, 1977.)

(237) "Unrefined and unprocessed ore" means ore in its natural form prior to any processing, such as grinding, roasting, beneficiating, or refining.

(238) "Unrestricted area" means an area, access to which is not controlled by the licensee or registrant for purposes of radiation protection.

(239) "Use" as used in radioactive materials licenses means to employ or apply radioactive materials for the licensed purpose. It shall include instruction of, and responsibility for, technical and support staff members. It does not include training others in the techniques of use of radioactive materials for the purpose of qualifying for licensure.

In licenses authorizing medical use of radioactive materials, "use" shall also include:

(i) ordering or directing the administration of radiation or radioactive materials to humans, including the method or route of administration;

(ii) actual use of, or direction of technologists or other paramedical personnel in the use of, radioactive material;

(iii) interpretation of results of diagnostic procedures; and

(iv) regular review of the progress of patients receiving therapy and modification of the originally prescribed dose as warranted by the patient's reaction to radiation therapy.

(240) "Useful beam" means the radiation emanating from the tube housing port or the radiation head and passing through the aperture of the beam limiting device when the exposure controls are in a mode to cause the system to produce radiation.

(241) "Variable-aperture beam-limiting device" means a beam-limiting device which has capacity for stepless adjustment of the x-ray field size at a given SID.

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(242) "Very high radiation area" means an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 5 Gy (500 rad) in 1 hour at 1 meter (3 feet) from a source of radiation or from any surface that the radiation penetrates. At very high doses received at high dose rates, units of absorbed dose (gray and rad) are appropriate, rather than units of dose equivalent (sievert and rem).

(243) "Visible area" means that portion of the input surface of the image receptor over which incident x-ray photons produce a visible image.

(244) "Waste" means those low-level radioactive wastes that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level waste has the same meaning as in the Low-Level Radioactive Waste Policy Act, P.L. 96-573, as amended by P.L. 99-240, effective January 15, 1986; that is, radioactive waste (a) not classified as high-level radioactive waste, spent nuclear fuel, or byproduct material as defined in Section 11e.(2) of the Atomic Energy Act (uranium or thorium tailings and waste) and (b) classified as low-level radioactive waste consistent with existing law and in accordance with (a) by the U.S. Nuclear Regulatory Commission.

(245) "Waste handling licensees" mean persons licensed to receive and store radioactive wastes prior to disposal and/or persons licensed to dispose of radioactive waste.

(246) "Week" means 7 consecutive days starting on Sunday.

(247) "Weighting factor" w_T for an organ or tissue (T) means the proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly. For calculating the effective dose equivalent, the values of w_T are:

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ORGAN DOSE WEIGHTING FACTORS

Organ or Tissue	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30a
Whole Body	1.00b

a 0.30 results from 0.06 for each of 5 "remainder" organs, excluding the skin and the lens of the eye, that receive the highest doses.

b For the purpose of weighting the external whole body dose, for adding it to the internal dose, a single weighting factor, $w_T = 1.0$, has been specified. The use of other weighting factors for external exposure will be approved on a case-by-case basis until such time as specific guidance is issued.

(248) "Whole body" means, for purposes of external exposure, head, trunk (including male gonads), arms above the elbow, or legs above the knee.

(249) "Worker" means an individual engaged in work under a license or registration issued by the Department and controlled by a licensee or registrant, but does not include the licensee or registrant.

(250) "Working level" (WL) means any combination of short-lived radon daughters in 1 liter of air that will result in the ultimate emission of $1.3E+5$ MeV of potential alpha particle energy. The short-lived radon daughters are:

(i) for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and

(ii) for radon-220: polonium-216, lead-212, bismuth-212, and polonium-212.

(251) "Working level month" (WLM) means an exposure to 1 working level for 170 hours (2,000 working hours per year divided by 12 months per year is approximately equal to 170 hours per month).

(252) "X-ray control" means a device which controls input power to the x-ray high-voltage generator and/or the x-ray tube. It includes equipment such as timers, phototimers, automatic brightness stabilizers, and similar devices, which control the technique factors of an x-ray exposure.

(253) "X-ray equipment" means an x-ray system, subsystem, or component thereof. Types of x-ray equipment are as follows:

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(i) "Mobile x-ray equipment" means x-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled.

(ii) "Portable x-ray equipment" means x-ray equipment designed to be hand carried.

(iii) "Stationary x-ray equipment" means x-ray equipment which is installed in a fixed location.

(254) "X-ray field" means that area of the intersection of the useful beam and any one of the set of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the exposure rate is one-fourth of the maximum in the intersection.

(255) "X-ray high-voltage generator" means a device which transforms electrical energy from the potential supplied by the x-ray control to the tube operating potential. The device may also include means for transforming alternating current to direct current, filament transformers for the x-ray tube(s), high-voltage switches, electrical protective devices, and other appropriate elements.

(256) "X-ray system" means an assemblage of components for the controlled production of x-rays. It includes minimally an x-ray high-voltage generator, an x-ray control, a tube housing assembly, a beam-limiting device, and the necessary supporting structures. Additional components which function with the system are considered integral parts of the system.

(258) "X-ray subsystem" means any combination of two or more components of an x-ray system for which there are requirements specified in this Article.

(259) "X-ray tube" means any electron tube which is designed for the conversion of electrical energy into x-ray energy. For the purposes of permit fee requirements in Article 5 of this Code, an x-ray tube means any electrical device which produces x-rays of intensity exceeding $1.29 E-4$ C-kg-1 (0.5 milliroentgen) per hour when measured 5

centimeters (2 inches) from any accessible surface thereof, and averaged over an area of 10 cm² (1.55 square inches).

(260) "Year" means the period of time beginning in January used to determine compliance with the provisions of this Code. The licensee or registrant may change the starting date of the year used to determine compliance by the licensee or registrant provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

Notes:

Subdivisions (1), (52), (78), (89), (116), (123), (144), (228) and (231) of subsection (a) were amended and subdivisions (88), (233) and (234) of subsection (a) were repealed April 26, 1999 to conform to definitions in 10 CFR Part 71 to ensure compatibility with the NRC. In addition, the definition of "Licensed Material" was clarified to include radioactive material that requires a license even if one has not been obtained as well as radioactive material that is the subject of a general or specific license.

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Compatibility With IAEA Transportation Safety Standards (TS-R-1) and Other Transportation Safety Amendments

(69 FR 3697, 58038 January 26, 2004) RATS ID 2004-1 Effective date 10/1/04

Due for State adoption: October 1, 2007

Change to NRC Section	Title	State Section	Compatibility Category	Summary of Change To CFR	Difference Yes/No	Significant Yes/No	If a Difference, Why Or Why Not was a Comment Generated?
§71.0	Purpose and scope.	§175.105(a)	D	<p>(a) This part establishes—</p> <p>(1) Requirements for packaging, preparation for shipment, and transportation of licensed material; and</p> <p>(2) Procedures and standards for NRC approval of packaging and shipping procedures for fissile material and for a quantity of other licensed material in excess of a Type A quantity.</p> <p>(b) The packaging and transport of licensed material are also subject to other parts of this chapter (e.g., 10 CFR parts 20, 21, 30, 40, 70, and 73) and to the regulations of other agencies (e.g., the U.S. Department of Transportation (DOT) and the U.S. Postal Service)¹ having jurisdiction over means of transport. The requirements of this part are in addition to, and not in substitution for, other requirements.</p> <p>(d)(1) Exemptions from the requirement for license in § 71.3 are specified in § 71.14. General licenses for which no NRC package approval is required are issued in §§ 71.20 through 71.23. The general license in § 71.17 requires that an NRC certificate of compliance or other package approval be issued for the package to be used under this general license.(2) Application for package approval must be completed in accordance with subpart D of this part, demonstrating that</p>	N/A		

			<p>the design of the package to be used satisfies the package approval standards contained in subpart E of this part, as related to the tests of subpart F of this part.</p> <p>(3) A licensee transporting licensed material, or delivering licensed material to a carrier for transport, shall comply with the operating control requirements of subpart G of this part; the quality assurance requirements of subpart H of this part; and the general provisions of subpart A of this part, including DOT regulations referenced in § 71.5.</p> <p>(e) The regulations of this part apply to any person holding, or applying for, a certificate of compliance, issued pursuant to this part, for a package intended for the transportation of radioactive material, outside the confines of a licensee's facility or authorized place of use.</p> <p>(f) The regulations in this part apply to any person required to obtain a certificate of compliance, or an approved compliance plan, pursuant to part 76 of this chapter, if the person delivers radioactive material to a common or contract carrier for transport or transports the material outside the confines of the person's plant or other authorized place of use.</p> <p>(g) This part also gives notice to all persons who knowingly provide to any licensee, certificate holder, quality assurance program approval holder, applicant for a license, certificate, or quality assurance program approval, or to a contractor, or subcontractor of any of them, components, equipment, materials, or other goods or services, that relate to a licensee's, certificate holder's, quality assurance program approval holder's, or applicant's activities subject to this part, that they may be individually subject to NRC enforcement action for violation of §</p>			
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				71.8. ----- ¹ Postal Service manual (Domestic Mail Manual), Section 124, which is incorporated by reference at 39 CFR 111.1.			
§71.0 (c)	Purpose and scope.		[B]	Amended Paragraph (c): (c) The regulations in this part apply to any licensee authorized by specific or general license issued by the Commission to receive, possess, use, or transfer licensed material, if the licensee delivers that material to a carrier for transport, transports the material outside the site of usage as specified in the NRC license, or transports that material on public highways. No provision of this part authorizes possession of licensed material.	N		

§71.1	Communications and records.		D	N/A			
§71.2	Interpretations.		D	N/A			
§71.3	Requirement for license.	175.105(a)(4)	[B]	Except as authorized in a general license or a specific license issued by the Commission, or as exempted in this part, no licensee may— (a) Deliver licensed material to a carrier for transport; or (b) Transport licensed material.	N		
§71.4	Definitions.	§175.02(a)(1)	[B]	Amended Definition: A ₁ means the maximum activity of special form radioactive material permitted in a	N		

				Type A package. This value is either listed in Appendix A, Table A-1, of this part, or may be derived in accordance with the procedures prescribed in Appendix A of this part.			
§71.4	Definitions.	§175.02(a)(1)	[B]	Amended Definition: A ₂ means the maximum activity of radioactive material, other than special form material, LSA, and SCO material, permitted in a Type A package. This value is either listed in Appendix A, Table A-1, of this part, or may be derived in accordance with the procedures prescribed in Appendix A of this part.	N		

§71.4	Definitions.	§175.02(a)(3) 3)	[B]	Amended Definition: Carrier means a person engaged in the transportation of passengers or property by land or water as a common, contract, or private carrier, or by civil aircraft.	N		
§71.4	Definitions.	§175.105(a) (i)	D- for those States which have no licensees that use Type B packages. or [B]- for those States which have licensees that use Type B	Amended Definition: Certificate holder means a person who has been issued a certificate of compliance or other package approval by the Commission.	N		

			packages.				
§71.4	Definitions.	§175.105(a) (ii)	D- for those States which have no licensees that use Type B packages. or [B]- for those States which have licensees that use Type B packages.	Amended Definition: Certificate of Compliance (CoC) means the certificate issued by the Commission under subpart D of this part which approves the design of a package for the transportation of radioactive material.	N		
§71.4	Definitions.	§175.105 (a)(iii)	D	Amended Definition: Close reflection by water means immediate contact by water of sufficient thickness for maximum reflection of neutrons.	N/A		
§71.4	Definitions.	§175.105 (a)(iv)	[B]	Amended Definition: Consignment means each shipment of a package or groups of packages or load of radioactive material offered by a shipper for transport.	N		
§71.4	Definitions.	§175.105 (a)(v)	D	Amended Definition: Containment system means the assembly of components of the packaging intended to retain the radioactive material during transport.	N		
§71.4	Definitions.	§175.02 (a)(52)	[B]	Amended Definition: Conveyance means: (1) For transport by public highway or rail any transport vehicle or large freight container;	N		

				(2) For transport by water any vessel, or any hold, compartment, or defined deck area of a vessel including any transport vehicle on board the vessel; and (3) For transport by any aircraft.			
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§71.4	Definitions.	§175.105 (a)(vi)	[B]	Amended Definition: Criticality Safety Index (CSI) means the dimensionless number (rounded up to the next tenth) assigned to and placed on the label of a fissile material package, to designate the degree of control of accumulation of packages containing fissile material during transportation. Determination of the criticality safety index is described in §§ 71.22, 71.23, and 71.59.	N		
§71.4	Definitions.		B	Amended Definition: Deuterium means, for the purposes of §§ 71.15 and 71.22, deuterium and any deuterium compounds, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000.	N/A		
§71.4	Definitions.		D	Amended Definition: DOT means the U.S. Department of Transportation.	N/A		This is spelled out in § 175.105(a)(1)(i)
§71.4	Definitions.	§175.02 (a)(78)	[B]	Amended Definition: Exclusive use means the sole use by a single consignor of a conveyance for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. The consignor and the carrier must ensure that any loading or unloading is performed by personnel having radiological training and resources appropriate for safe handling of the	N		

				consignment. The consignor must issue specific instructions, in writing, for maintenance of exclusive use shipment controls, and include them with the shipping paper information provided to the carrier by the consignor.			
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§71.4	Definitions.	§175.02 (a)(89)	[B]	Amended Definition: Fissile material means the radionuclides uranium-233, uranium-235, plutonium-239, and plutonium-241, or any combination of these radionuclides. Fissile material means the fissile nuclides themselves, not material containing fissile nuclides. Unirradiated natural uranium and depleted uranium and natural uranium or depleted uranium, that has been irradiated in thermal reactors only, are not included in this definition. Certain exclusions from fissile material controls are provided in § 71.15.	Y	N	Some isotopes listed in different order. Of no significance
§71.4	Definitions.		D	Amended Definition: Graphite means, for the purposes of §§ 71.15 and 71.22, graphite with a boron equivalent content less than 5 parts per million and density greater than 1.5 grams per cubic centimeter.	N/A		
§71.4	Definitions.	§175.02 (a)(116)	[D]	Amended Definition: Licensed material means byproduct, source, or special nuclear material received, possessed, used, or transferred under a general or specific license issued by the Commission pursuant to the regulations in this chapter.	N		

§71.4	Definitions.	§175.105 (a)(iii)	[B]	<p>Amended Definition: Low Specific Activity (LSA) material means radioactive material with limited specific activity which is nonfissile or is excepted under § 71.15, and which satisfies the descriptions and limits set forth below. Shielding materials surrounding the LSA material may not be considered in determining the estimated average specific activity of the package contents. LSA material must be in one of three groups:</p> <p>(1) LSA—I.</p> <p>(i) Uranium and thorium ores, concentrates of uranium and thorium ores, and other ores containing naturally occurring radioactive radionuclides which are not intended to be processed for the use of these radionuclides;</p> <p>(ii) Solid unirradiated natural uranium or depleted uranium or natural thorium or their solid or liquid compounds or mixtures;</p> <p>(iii) Radioactive material for which the A2 value is unlimited; or</p> <p>(iv) Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the value for exempt material activity concentration determined in accordance with Appendix A.</p> <p>(2) LSA—II.</p> <p>(i) Water with tritium concentration up to 0.8 TBq/liter (20.0 Ci/liter); or</p> <p>(ii) Other material in which the activity is distributed throughout and the average specific activity does not exceed $10^{-4} A2/g$ for solids and gases, and $10^{-5} A2/g$ for liquids.</p> <p>(3) LSA—III. Solids (e.g., consolidated</p>	N		
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				<p>wastes, activated materials), excluding powders, that satisfy the requirements of § 71.77, in which:(i) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);</p> <p>(ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that even under loss of packaging, the loss of radioactive material per package by leaching, when placed in water for 7 days, would not exceed 0.1 A2; and</p> <p>(iii) The estimated average specific activity of the solid does not exceed 2×10^{-3} A2/g.</p>			
§71.4	Definitions.	§175.105 (a)(vii)	[B]	<p>Amended Definition: Low toxicity alpha emitters means natural uranium, depleted uranium, natural thorium; uranium-235, uranium- 238, thorium-232, thorium-228 or thorium-230 when contained in ores or physical or chemical concentrates or tailings; or alpha emitters with a half-life of less than 10 days.</p>	N		
§71.4	Definitions.	§175.105 (a)(viii)	D	<p>Amended Definition: Maximum normal operating pressure means the maximum gauge pressure that would develop in the containment system in a period of 1 year under the heat condition specified in § 71.71(c)(1), in the absence of venting, external cooling by an ancillary system, or operational controls during transport.</p>	N		

§71.4	Definitions.	§175.105 (a)(ix)	[B]	Amended Definition: Natural thorium means thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium-232).	N		
§71.4	Definitions.	§175.02 (a)(139)	[B]	Amended Definition: Normal form radioactive material means radioactive material that has not been demonstrated to qualify as “special form radioactive material.”	N/A N		
§71.4	Definitions.	§175.105 (a)(x)	D	Amended Definition: Optimum interspersed hydrogenous moderation means the presence of hydrogenous material between packages to such an extent that the maximum nuclear reactivity results.	N		

§71.4	Definitions.	§175.02 (a)(144)	[B]	Amended Definition: Package means the packaging together with its radioactive contents as presented for transport. (1) Fissile material package or Type AF package, Type BF package, Type B(U)F package, or Type B(M)F package means a fissile material packaging together with its fissile material contents. (2) Type A package means a Type A packaging together with its radioactive contents. A Type A package is defined and must comply with the DOT regulations in 49 CFR part 173. (3) Type B package means a Type B packaging together with its radioactive contents. On approval, a Type B package design is designated by NRC as B(U) unless the package has a maximum normal operating pressure of more than 700 kPa (100 lbs/in ²) gauge or a pressure relief	N		
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				<p>device that would allow the release of radioactive material to the environment under the tests specified in § 71.73 (hypothetical accident conditions), in which case it will receive a designation B(M). B(U) refers to the need for unilateral approval of international shipments; B(M) refers to the need for multilateral approval of international shipments. There is no distinction made in how packages with these designations may be used in domestic transportation. To determine their distinction for international transportation, see DOT regulations in 49 CFR Part 173. A Type B package approved before September 6, 1983, was designated only as Type B. Limitations on its use are specified in § 71.19.</p>			
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§71.4	Definitions.	§175.02 (a)(145)	[B]	<p>Amended Definition: Packaging means the assembly of components necessary to ensure compliance with the packaging requirements of this part. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, tiedown system, and auxiliary equipment may be designated as part of the packaging.</p>	N		
§71.4	Definitions.	§175.02 (a)(211)	[B]	<p>Amended Definition: Special form radioactive material means radioactive material that satisfies the following conditions: (1) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;</p>	N/A N		

				<p>(2) The piece or capsule has at least one dimension not less than 5 mm (0.2 in); and</p> <p>(3) It satisfies the requirements of § 71.75.</p> <p>A special form encapsulation designed in accordance with the requirements of § 71.4 in effect on June 30, 1983 (see 10 CFR part 71, revised as of January 1, 1983), and constructed before July 1, 1985, and a special form encapsulation designed in accordance with the requirements of § 71.4 in effect on March 31, 1996 (see 10 CFR part 71, revised as of January 1, 1983), and constructed before April 1, 1998, may continue to be used. Any other special form encapsulation must meet the specifications of this definition.</p>			
§71.4	Definitions.	§175.02 (a)(214)	[B]	<p>Amended Definition: Specific activity of a radionuclide means the radioactivity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.</p>	N/A N		

§71.4	Definitions.	§175.105 (a)(xi)	D	<p>Amended Definition:Spent nuclear fuel or Spent fuel means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least 1 year's decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes the special nuclear material, byproduct material, source material, and other radioactive materials</p>	N		
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				associated with fuel assemblies.			
§71.4	Definitions.		D	Amended Definition: State means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.	Y	Y	In Article 175, "State" means "State of New York" unless otherwise indicated. Can't change State of New York to State of U.S., DC, Puerto Rico, Virgin Islands in NYC Health Code

§71.4	Definitions.	§175.105 (a)(xii)	[B]	Amended Definition: Surface Contaminated Object (SCO) means a solid object that is not itself classed as radioactive material, but which has radioactive material distributed on any of its surfaces. SCO must be in one of two groups with surface activity not exceeding the following limits: (1) SCO-I: A solid object on which: (i) The nonfixed contamination on the accessible surface averaged over 300 Cm ² (or the area of the surface if less than 300 Cm ²) does not exceed 4 Bq/Cm ² (10 ⁻⁴ microcurie/Cm ²) for beta and gamma and low toxicity alpha emitters, or 0.4 Bq/Cm ² (10 ⁻⁵ microcurie/Cm ²) for all other alpha emitters; (ii) The fixed contamination on the accessible surface averaged over 300 Cm ² (or the area of the surface if less than 300 Cm ²) does not exceed 4 × 10 ⁻⁴ Bq/Cm ² (1.0 microcurie/Cm ²) for beta and gamma and low toxicity alpha emitters, or 4 × 10 ³ Bq/Cm ² (0.1 microcurie/Cm ²) for all other alpha emitters; and	N		
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				<p>(iii) The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 Cm² (or the area of the surface if less than 300 Cm²) does not exceed 4×10^4 Bq/Cm² (1 microcurie/Cm²) for beta and gamma and low toxicity alpha emitters, or 4×10^3 Bq/Cm² (0.1 microcurie/Cm²) for all other alpha emitters.</p> <p>(2) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:</p> <p>(i) The nonfixed contamination on the accessible surface averaged over 300 Cm² (or the area of the surface if less than 300 Cm²) does not exceed 400 Bq/Cm² (10⁻² microcurie/Cm²) for beta and gamma and low toxicity alpha emitters or 40 Bq/Cm² (10⁻³ microcurie/Cm²) for all other alpha emitters;</p> <p>(ii) The fixed contamination on the accessible surface averaged over 300 Cm² (or the area of the surface if less than 300 Cm²) does not exceed 8×10^5 Bq/Cm² (20 microcuries/Cm²) for beta and gamma and low toxicity alpha emitters, or 8×10^4 Bq/Cm² (2 microcuries/Cm²) for all other alpha emitters; and</p> <p>(iii) The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 Cm² (or the area of the surface if less than 300 2) does not exceed 8×10^5 Bq/ Cm² (20 microcuries/Cm²) for beta and gamma and low toxicity alpha emitters, or 8×10^4 Bq/Cm² (2 microcuries/Cm²) for all other alpha emitters.</p>			
§71.4	Definitions.	§175.02 (a)(228)	[B]	<p>Amended Definition: Transport index (TI) means the dimensionless number (rounded up to the</p>	N		

				next tenth) placed on the label of a package, to designate the degree of control to be exercised by the carrier during transportation. The transport index is the number determined by multiplying the maximum radiation level in millisievert (mSv) per hour at 1 meter (3.3 ft) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at 1 meter (3.3 ft)).			
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§71.4	Definitions.	§175.02 (a)(232)	[B]	Amended Definition: Type A quantity means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A1 for special form radioactive material, or A2, for normal form radioactive material, where A1 and A2 are given in Table A-1 of this part, or may be determined by procedures described in Appendix A of this part.	N		
§71.4	Definitions.	§175.02 (a)(235)	[B]	Amended Definition: Type B quantity means a quantity of radioactive material greater than a Type A quantity.	N		
§71.4	Definitions.	§175.105 (a)(xiii)	[B]	Amended Definition: Unirradiated uranium means uranium containing not more than 2×10^3 Bq of plutonium per gram of uranium-235, not more than 9×10^6 Bq of fission products per gram of uranium-235, and not more than 5×10^{-3} g of uranium-236 per gram of uranium-235.	N		
§71.4	Definitions.	§175.105 (a)(xiv)	[B]	Amended Definition: Uranium—natural, depleted, enriched: (1) Natural uranium means uranium with the naturally occurring distribution of	N		

				<p>uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238).</p> <p>(2) Depleted uranium means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.</p> <p>(3) Enriched uranium means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.</p>			
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§71.5	Transportation of licensed material.	§175.105 (a)(6)(i)	[B]	<p>Amended Section: (a) Each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport. (1) The licensee shall particularly note DOT regulations in the following areas: (i) Packaging--49 CFR part 173: subparts A, B, and I. (ii) Marking and labeling--49 CFR part 172: subpart D; and Sec. Sec. 172.400 through 172.407 and Sec. Sec. 172.436 through 172.441 of subpart E. (iii) Placarding--49 CFR part 172: subpart F,</p>	N		
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				<p>especially Sec. Sec. 172.500 through 172.519 and 172.556; and appendices B and C. (iv) Accident reporting--49 CFR part 171: Sec. Sec. 171.15 and 171.16. (v) Shipping papers and emergency information--49 CFR part 172: subparts C and G. (vi) Hazardous material employee training--49 CFR part 172: subpart H. (vii) Security plans--49 CFR part 172: subpart I. (viii) Hazardous material shipper/carrier registration--49 CFR part 107: subpart G. (2) The licensee shall also note DOT regulations pertaining to the following modes of transportation: (i) Rail--49 CFR part 174: subparts A through D and K. (ii) Air--49 CFR part 175. (iii) Vessel--49 CFR part 176: subparts A through F and M. (iv) Public Highway--49 CFR part 177 and parts 390 through 397.</p> <p>(b) If DOT regulations are not applicable to a shipment of licensed material, the licensee shall conform to the standards and requirements of the DOT specified in paragraph (a) of this section to the same extent as if the shipment or transportation were subject to DOT regulations. A request for modification, waiver, or exemption from those requirements, and any notification referred to in those requirements, must be filed with, or made to, the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.</p>			
§71.6	Information collection requirements: OMB approval.		D	N/A			
§71.7	Completeness and		D	N/A			

	accuracy of information						
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§71.8	Deliberate misconduct.		C	<p>Amended Section:</p> <p>(a) This section applies to any—</p> <ol style="list-style-type: none"> (1) Licensee; (2) Certificate holder; (3) Quality assurance program approval holder; (4) Applicant for a license, certificate, or quality assurance program approval; (5) Contractor (including a supplier or consultant) or subcontractor, to any person identified in paragraph (a)(4) of this section; <p>or</p> <ol style="list-style-type: none"> (6) Employees of any person identified in paragraphs (a)(1) through (a)(5) of this section. <p>(b) A person identified in paragraph (a) of this section who knowingly provides to any entity, listed in paragraphs (a)(1) through (a)(5) of this section, any components, materials, or other goods or services that relate to a licensee's, certificate holder's, quality assurance program approval holder's, or applicant's activities subject to this part may not:</p> <ol style="list-style-type: none"> (1) Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee, certificate holder, quality assurance program approval holder, or any applicant to be in violation of any 			
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rule, regulation, or order; or any term, condition or limitation of any license, certificate, or approval issued by the Commission; or
(2) Deliberately submit to the NRC, a licensee, a certificate holder, quality assurance program approval holder, an applicant for a license, certificate or quality assurance program approval, or a licensee's, applicant's, certificate holder's, or quality assurance program approval holder's contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the NRC.

(c) A person who violates paragraph (b)(1) or (b)(2) of this section may be subject to enforcement action in accordance with the procedures in 10 CFR part 2, subpart B.

(d) For the purposes of paragraph (b)(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 holder, quality assurance program approval holder, or applicant for a license, certificate, or quality assurance program approval to be in violation of any rule, regulation, or order; or any term, condition, or limitation of any license or certificate issued by the Commission; or

(2) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, certificate holder, quality assurance program approval holder, applicant, or the contractor or subcontractor of any of them.

§71.9	Employee protection.		D	N/A			
§71.10	Public inspection of application		D	N/A			
§71.11				[Reserved]			
§71.12	Specific exemptions.		D	N/A			
§71.13	Exemption of physicians.	§175.105 (b)(i)	[B]	<p>Amended Section: Any physician licensed by a State to dispense drugs in the practice of medicine is exempt from § 71.5 with respect to transport by the physician of licensed material for use in the practice of medicine. However, any physician operating under this exemption must be licensed under 10 CFR part 35 or the equivalent Agreement State regulations.</p>	N		

§71.14 (a)	Exemption for low-level materials.	§175.105 (b)(2)(i)	[B]	<p>Amended Paragraph: (a) A licensee is exempt from all the requirements of this part with respect to shipment or carriage of the following low-level materials: (1) Natural material and ores containing naturally occurring radionuclides that are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in Appendix A, Table A-2, of this part.(2) Materials for which the activity</p>	N		
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				concentration is not greater than the activity concentration values specified in Appendix A, Table A-2 of this part, or for which the consignment activity is not greater than the limit for an exempt consignment found in Appendix A, Table A-2, of this part.			
§71.14 (b)	Exemption for low-level materials.	§175.105 (b)(2)(ii)	NRC	<p>Amended Paragraph:</p> <p>(b) A licensee is exempt from all the requirements of this part, other than §§ 71.5 and 71.88, with respect to shipment or carriage of the following packages, provided the packages do not contain any fissile material, or the material is exempt from classification as fissile material under § 71.15:</p> <p>(1) A package that contains no more than a Type A quantity of radioactive material;</p> <p>(2) A package transported within the United States that contains no more than 0.74 TBq (20 Ci) of special form plutonium-244; or</p> <p>(3) The package contains only LSA or SCO radioactive material, provided—</p> <p>(i) That the LSA or SCO material has an external radiation dose of less than or equal to 10 mSv/h (1 rem/h), at a distance of 3 m from the unshielded material; or</p> <p>(ii) That the package contains only LSA-I or SCO-I material.</p>			

§71.15	Exemption	§175.105 (b)(3)	[B]	Amended Paragraph: Fissile material	N		
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	from classification as fissile material.			<p>meeting the requirements of at least one of the paragraphs (a) through (f) of this section are exempt from classification as fissile material and from the fissile material package standards of §§ 71.55 and 71.59, but are subject to all other requirements of this part, except as noted.</p> <p>(a) Individual package containing 2 grams or less fissile material.</p> <p>(b) Individual or bulk packaging containing 15 grams or less of fissile material provided the package has at least 200 grams of solid nonfissile material for every gram of fissile material. Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass for solid nonfissile material.</p> <p>(c)(1) Low concentrations of solid fissile material commingled with solid nonfissile material, provided that:</p> <p>(i) There is at least 2000 grams of solid nonfissile material for every gram of fissile material, and</p> <p>(ii) There is no more than 180 grams of fissile material distributed within 360 kg of contiguous nonfissile material.</p> <p>(2) Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass of solid nonfissile material.</p> <p>(d) Uranium enriched in uranium-235 to a maximum of 1 percent by weight, and with total plutonium and uranium-233 content of up to 1 percent of the mass of uranium-235, provided that the mass of any beryllium, graphite, and hydrogenous material enriched in deuterium constitutes less than 5 percent of the uranium mass.</p>			
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				<p>(e) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 percent by mass, with a total plutonium and uranium-233 content not exceeding 0.002 percent of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2. The material must be contained in at least a DOT Type A package.</p> <p>(f) Packages containing, individually, a total plutonium mass of not more than 1000 grams, of which not more than 20 percent by mass may consist of plutonium-239, plutonium-241, or any combination of these radionuclides.</p>			
§71.16				[Reserved]			

§71.17	General license: NRC-approved package.	§175.105 (c)(1)	[B]	<p>(a) A general license is issued to any licensee of the Commission to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC.(b) This general license applies only to a licensee who has a quality assurance program approved by the Commission as satisfying the provisions of subpart H of this part.</p> <p>(c) This general license applies only to a licensee who—</p> <p>(1) Has a copy of the CoC, or other approval of the package, and has the</p>	N		
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				<p>drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken before shipment;</p> <p>(2) Complies with the terms and conditions of the license, certificate, or other approval, as applicable, and the applicable requirements of subparts A, G, and H of this part; and</p> <p>(3) Before the licensee's first use of the package, submits in writing to: ATTN: Document Control Desk, Director, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards, using an appropriate method listed in § 71.1(a), the licensee's name and license number and the package identification number specified in the package approval.</p> <p>(d) This general license applies only when the package approval authorizes use of the package under this general license.</p> <p>(e) For a Type B or fissile material package, the design of which was approved by NRC before April 1, 1996, the general license is subject to the additional restrictions of § 71.19.</p>			
§71.18				[Reserved]			

§71.20	General license: DOT specification container.	§175.105 (c)(3)	[B]	<p>Amended Section:</p> <p>(a) A general license is issued to any licensee of the Commission to transport, or to deliver to a carrier for transport, licensed material in a specification container for fissile material or for a Type B quantity of radioactive material as specified in DOT regulations at 49 CFR parts 173 and 178.</p>	N		
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				<p>(b) This general license applies only to a licensee who has a quality assurance program approved by the Commission as satisfying the provisions of subpart H of this part.</p> <p>(c) This general license applies only to a licensee who—</p> <p>(1) Has a copy of the specification; and</p> <p>(2) Complies with the terms and conditions of the specification and the applicable requirements of subparts A, G, and H of this part.</p> <p>(d) This general license is subject to the limitation that the specification container may not be used for a shipment to a location outside the United States, except by multilateral approval, as defined in DOT regulations at 49 CFR 173.403.(e) This section expires October 1, 2008.</p>			
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§71.21	General license: Use of foreign approved package.	§175.105 (c)(4)	[B]	<p>Amended Paragraph:</p> <p>(a) A general license is issued to any licensee of the Commission to transport, or to deliver to a carrier for transport, licensed material in a package, the design of which has been approved in a foreign national competent authority certificate, that has been revalidated by DOT as meeting the applicable requirements of 49 CFR 171.12.</p> <p>(b) Except as otherwise provided in this section, the general license applies only to a licensee who has a quality assurance program approved by the Commission as satisfying the applicable provisions of subpart H of this part.</p>	N		
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				<p>(c) This general license applies only to shipments made to or from locations outside the United States.</p> <p>(d) This general license applies only to a licensee who—</p> <p>(1) Has a copy of the applicable certificate, the revalidation, and the drawings and other documents referenced in the certificate, relating to the use and maintenance of the packaging and to the actions to be taken before shipment; and</p> <p>(2) Complies with the terms and conditions of the certificate and revalidation, and with the applicable requirements of subparts A, G, and H of this part. With respect to the quality assurance provisions of subpart H of this part, the licensee is exempt from design, construction, and fabrication considerations.</p>			
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§71.22	General license: Fissile material.	§175.105 (c)(5)	[B]	<p>Amended Section: REFERENCE 10CFR71 for Tables 71-1 and 71-2</p> <p>(a) A general license is issued to any licensee of the Commission to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section. The fissile material need not be contained in a package which meets the standards of subparts E and F of this part; however, the</p>	N		
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material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).

(b) The general license applies only to a licensee who has a quality assurance program approved by the Commission as satisfying the provisions of subpart H of this part.

(c) The general license applies only when a package's contents:

- (1) Contain less than a Type A quantity of fissile material; and
- (2) Contain less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium.

(d) The general license applies only to packages containing fissile material that are labeled with a CSI which:

- (1) Has been determined in accordance with paragraph (e) of this section;
- (2) Has a value less than or equal to 10; and
- (3) For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

(e)(1) The value for the CSI must be greater than or equal to the number calculated by the following equation:

				<p>(2) The calculated CSI must be rounded up to the first decimal place;</p> <p>(3) The values of X, Y, and Z used in the CSI equation must be taken from Tables 71-1 or 71-2, as appropriate;</p> <p>(4) If Table 71-2 is used to obtain the value of X, then the values for the terms in the equation for uranium-233 and plutonium must be assumed to be zero; and(5) Table 71-1 values for X, Y, and Z must be used to determine the CSI if:</p> <p>(i) Uranium-233 is present in the package;</p> <p>(ii) The mass of plutonium exceeds 1 percent of the mass of uranium-235;</p> <p>(iii) The uranium is of unknown uranium-235 enrichment or greater than 24 weight percent enrichment; or</p> <p>(iv) Substances having a moderating effectiveness (i.e., an average hydrogen density greater than H₂O) (e.g., certain hydrocarbon oils or plastics) are present in any form, except as polyethylene used for packing or wrapping.</p>			
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§71.23	General license: Plutonium beryllium special form material.	§175.105 (c)(6)	[B]	<p>Amended Paragraph:</p> <p>(a) A general license is issued to any licensee of the Commission to transport fissile material in the form of plutonium-beryllium (Pu-Be) special form sealed sources, or to deliver Pu-Be sealed sources to a carrier for transport, if the material is shipped in accordance with this section. This material need not be contained in a package which meets the standards of</p>	N		
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subparts E and F of this part; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).

(b) The general license applies only to a licensee who has a quality assurance program approved by the Commission as satisfying the provisions of subpart H of this part.

(c) The general license applies only when a package's contents:

- (1) Contain less than a Type A quantity of material; and
- (2) Contain less than 1000 g of plutonium, provided that: plutonium-239, plutonium-241, or any combination of these radionuclides, constitutes less than 240 g of the total quantity of plutonium in the package.

(d) The general license applies only to packages labeled with a CSI which:

- (1) Has been determined in accordance with paragraph (e) of this section;
- (2) Has a value less than or equal to 100; and
- (3) For a shipment of multiple packages containing Pu-Be sealed sources, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

(e)(1) The value for the CSI must be

				greater than or equal to the number calculated by the following equation: and (2) The calculated CSI must be rounded up to the first decimal place.			
§71.24				[Reserved]			
§71.25				[Reserved]			

§71.47	External radiation standards for all packages	By reference in 175.105(d)(3)(ix)	[B]	<p>Amended Paragraph:</p> <p>(a) Except as provided in paragraph (b) of this section, each package of radioactive materials offered for transportation must be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed 2 mSv/h (200 mrem/h) at any point on the external surface of the package, and the transport index does not exceed 10.</p> <p>(b) A package that exceeds the radiation level limits specified in paragraph (a) of this section must be transported by exclusive use shipment only, and the radiation levels for such shipment must not exceed the following during transportation: (1) 2 mSv/h (200 mrem/h) on the external surface of the package, unless the following conditions are met, in which case the limit is 10 mSv/h (1000 mrem/h): (i) The shipment is made in a closed transport vehicle; (ii) The package is secured within the vehicle so that its position remains fixed</p>			Incorporated by reference in §175.105(d)(3)
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			<p>during transportation; and</p> <p>(iii) There are no loading or unloading operations between the beginning and end of the transportation;</p> <p>(2) 2 mSv/h (200 mrem/h) at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load or enclosure, if used, and on the lower external surface of the vehicle; and</p> <p>(3) 0.1 mSv/h (10 mrem/h) at any point 2 meters (80 in) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and</p> <p>(4) 0.02 mSv/h (2 mrem/h) in any normally occupied space, except that this provision does not apply to private carriers, if exposed personnel under their control wear radiation dosimetry devices in conformance with 10 CFR 20.1502.</p> <p>(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions to the carrier for maintenance of the exclusive use shipment controls. The instructions must be included with the shipping paper information.</p> <p>(d) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions that will</p>			
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				unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.			
§71.53				[Reserved]			
§71.81	Applicability of operating controls and procedures		D	N/A			
§71.83	Assumptions as to unknown properties.	§175.105 (d)(3)(xii)	[B]	Amended Section: When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile material as if the unknown properties have credible values that will cause the maximum neutron multiplication.	N		
§71.85	Preliminary determinations.	§175.105 (d)(2)	[B]	Amended Section: Before the first use of any packaging for the shipment of licensed material -- (a) The licensee shall ascertain that there are no cracks, pinholes, uncontrolled voids, or other defects that could significantly reduce the effectiveness of the packaging; (b) Where the maximum normal operating pressure will exceed 35 kPa (5 lbf/in ²) gauge, the licensee shall test the containment system at an internal pressure at least 50 percent higher than the maximum normal operating pressure, to verify the capability of that system to maintain its structural integrity at that pressure; and	n		

				(c) The licensee shall conspicuously and durably mark the packaging with its model number, serial number, gross weight, and a package identification number assigned by NRC. Before applying the model number, the licensee shall determine that the packaging has been fabricated in accordance with the design approved by the Commission.			
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§71.87	Routine determinations.	§175.105 (d)(3)	[B]	<p>Amended Section: Before each shipment of licensed material, the licensee shall ensure that the package with its contents satisfies the applicable requirements of this part and of the license. The licensee shall determine that --(a) The package is proper for the contents to be shipped; (b) The package is in unimpaired physical condition except for superficial defects such as marks or dents; (c) Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects; (d) Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid; (e) Any pressure relief device is operable and set in accordance with written</p>	N		
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				<p>procedures;</p> <p>(f) The package has been loaded and closed in accordance with written procedures;</p> <p>(g) For fissile material, any moderator or neutron absorber, if required, is present and in proper condition;</p> <p>(h) Any structural part of the package that could be used to lift or tie down the package during transport is rendered inoperable for that purpose, unless it satisfies the design requirements of § 71.45;</p> <p>(i) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment is as low as reasonably achievable, and within the limits specified in DOT regulations in 49 CFR 173.443;</p> <p>(j) External radiation levels around the package and around the vehicle, if applicable, will not exceed the limits specified in § 71.47 at any time during transportation; and</p> <p>(k) Accessible package surface temperatures will not exceed the limits specified in § 71.43(g) at any time during transportation.</p>			
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§71.88	Air transport of plutonium.	§175.105 (d)(4)	[B]	<p>Amended Section:</p> <p>(a) Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this part or</p>	N		
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included indirectly by citation of 49 CFR chapter I, as may be applicable, the licensee shall assure that plutonium in any form, whether for import, export, or domestic shipment, is not transported by air or delivered to a carrier for air transport unless:

- (1) The plutonium is contained in a medical device designed for individual human application; or
- (2) The plutonium is contained in a material in which the specific activity is less than or equal to the activity concentration values for plutonium specified in Appendix A, Table A-2, of this part, and in which the radioactivity is essentially uniformly distributed; or
- (3) The plutonium is shipped in a single package containing no more than an A₂ quantity of plutonium in any isotope or form, and is shipped in accordance with § 71.5; or
- (4) The plutonium is shipped in a package specifically authorized for the shipment of plutonium by air in the Certificate of Compliance for that package issued by the Commission.

(b) Nothing in paragraph (a) of this section is to be interpreted as removing or diminishing the requirements of § 73.24 of this chapter.

(c) For a shipment of plutonium by air which is subject to paragraph (a)(4) of this section, the licensee shall, through special arrangement with the carrier, require compliance with 49 CFR 175.704, U.S. Department of Transportation regulations applicable to the air transport of plutonium.

§71.89	Opening instructions.	§175.105 (d)(5)	[B]	Amended Section: Before delivery of a package to a carrier for transport, the licensee shall ensure that any special instructions needed to safely open the package have been sent to, or otherwise made available to, the consignee for the consignee's use in accordance with 10 CFR 20.1906(e).	N		
§71.91	Records.		D	N/A			
§71.93	Inspection and tests.		D	N/A			
§71.95	Reports.		D	N/A			

§71.97	Advance notification of shipment of irradiated reactor fuel and nuclear waste.	§175.105 (d)(9)	B	Amended Section: (a) As specified in paragraphs (b), (c) and (d) of this section, each licensee shall provide advance notification to the governor of a State, or the governor's designee, of the shipment of licensed material, through, or across the boundary of the State, before the transport, or delivery to a carrier, for transport, of licensed material outside the confines of the licensee's plant or other place of use or storage.	N		
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			<p>(b) Advance notification is required under this section for shipments of irradiated reactor fuel in quantities less than that subject to advance notification requirements of § 73.37(f) of this chapter. Advance notification is also required under this section for shipment of licensed material, other than irradiated fuel, meeting the following three conditions:</p> <p>(1) The licensed material is required by this part to be in Type B packaging for transportation;</p> <p>(2) The licensed material is being transported to or across a State boundary en route to a disposal facility or to a collection point for transport to a disposal facility; and</p> <p>(3) The quantity of licensed material in a single package exceeds the least of the following:</p> <p>(i) 3000 times the A_1 value of the radionuclides as specified in appendix A, Table A-1 for special form radioactive material;</p> <p>(ii) 3000 times the A_2 value of the radionuclides as specified in appendix A, Table A-1 for normal form radioactive material; or</p> <p>(iii) 1000 TBq (27,000 Ci).</p> <p>(c) Procedures for submitting advance notification. (1) The notification must be made in writing to the office of each appropriate governor or governor's designee and to the Director, Division of Nuclear Security, Office of Nuclear Security and Incident Response.</p> <p>(2) A notification delivered by mail must be postmarked at least 7 days before the beginning of the 7-day period during which departure of the shipment is estimated to</p>			
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occur.

(3) A notification delivered by any other means than mail must reach the office of the governor or of the governor's designee at least 4 days before the beginning of the 7-day period during which departure of the shipment is estimated to occur.

(i) A list of the names and mailing addresses of the governors' designees receiving advance notification of transportation of nuclear waste was published in the Federal Register on June 30, 1995 (60 FR 34306).

(ii) The list will be published annually in the Federal Register on or about June 30 to reflect any changes in information.

(iii) A list of the names and mailing addresses of the governors' designees is available on request from the Director, Office of State Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

(4) The licensee shall retain a copy of the notification as a record for 3 years.

(d) Information to be furnished in advance notification of shipment. Each advance notification of shipment of irradiated reactor fuel or nuclear waste must contain the following information:

(1) The name, address, and telephone number of the shipper, carrier, and receiver of the irradiated reactor fuel or nuclear waste shipment;

(2) A description of the irradiated reactor fuel or nuclear waste contained in the shipment, as specified in the regulations of DOT in 49 CFR 172.202 and 172.203(d);

(3) The point of origin of the shipment and the 7-day period during which departure of the shipment is estimated to occur;

				(4) The 7-day period during which arrival of the shipment at State boundaries is estimated to occur; (5) The destination of the shipment, and the 7-day period during which arrival of the shipment is estimated to occur; and (6) A point of contact, with a telephone number, for current shipment information.			
§71.00	Violations		D	N/A			
§71.100	Criminal penalties.		D	N/A			

§71.101 (a), (b), (c)(1)	Quality assurance requirements.	§175.105 (e)	D for those States which have no users of Type B packages-other than Industrial Radiography C for those States which have users of Type B packages-other than Industrial Radiography ** **Note: 10	Amended Paragraphs (a), (b)&(c)(1): (a) Purpose. This subpart describes quality assurance requirements applying to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of components of packaging that are important to safety. As used in this subpart, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of the material or component to predetermined requirements. The licensee, certificate holder, and applicant for a CoC are responsible for the quality assurance	N		
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			<p>CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B Package users are covered by 10 CFR 34.31(b). It is also indicated that this section satisfies § 71.12 (b) and thus would satisfy those sections referenced in this provision (§§ 71.101 through 71.137)</p>	<p>requirements as they apply to design, fabrication, testing, and modification of packaging. Each licensee is responsible for the quality assurance provision which applies to its use of a packaging for the shipment of licensed material subject to this subpart.</p> <p>(b) Establishment of program. Each licensee, certificate holder, and applicant for a CoC shall establish, maintain, and execute a quality assurance program satisfying each of the applicable criteria of §§ 71.101 through 71.137 and satisfying any specific provisions that are applicable to the licensee's activities including procurement of packaging. The licensee, certificate holder, and applicant for a CoC shall execute the applicable criteria in a graded approach to an extent that is commensurate with the quality assurance requirement's importance to safety.</p> <p>(c) Approval of program.</p> <p>(1) Before the use of any package for the shipment of licensed material subject to this subpart, each licensee shall obtain Commission approval of its quality assurance program. Using an appropriate method listed in § 71.1(a), each licensee shall file a description of its quality assurance program, including a discussion of which requirements of this subpart are applicable and how they will be satisfied, by submitting the description to: ATTN: Document Control Desk, Director, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards.</p>			
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§71.101	Quality		NRC	Amended Paragraphs (c)(2), (d)&(e):			
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(c)(2), (d)&(e)	assurance requireme nts.			<p>(c)(2) Before the fabrication, testing, or modification of any package for the shipment of licensed material subject to this subpart, each licensee, certificate holder, or applicant for a CoC shall obtain Commission approval of its quality assurance program. Each certificate holder or applicant for a CoC shall, in accordance with § 71.1, file a description of its quality assurance program, including a discussion of which requirements of this subpart are applicable and how they will be satisfied.</p> <p>(d) Existing package designs. The provisions of this paragraph deal with packages that have been approved for use in accordance with this part before January 1, 1979, and which have been designed in accordance with the provisions of this part in effect at the time of application for package approval. Those packages will be accepted as having been designed in accordance with a quality assurance program that satisfies the provisions of paragraph (b) of this section.</p> <p>(e) Existing packages. The provisions of this paragraph deal with packages that have been approved for use in accordance with this part before January 1, 1979, have been at least partially fabricated before that date, and for which the fabrication is in accordance with the provisions of this part in effect at the time of application for approval of package design. These packages will be accepted as having been fabricated and assembled in accordance with a quality assurance program that satisfies the provisions of paragraph (b) of this section.</p>			
§71.101 (f)	Quality assurance	§175.105 (e)(1)(vi)	D	Amended Paragraph (f): (f) Previously approved programs. A	N/A N		

	requirements.			Commission-approved quality assurance program that satisfies the applicable criteria of subpart H of this part, Appendix B of part 50 of this chapter, or subpart G of part 72 of this chapter, and that is established, maintained, and executed regarding transport packages, will be accepted as satisfying the requirements of paragraph (b) of this section. Before first use, the licensee, certificate holder, and applicant for a CoC shall notify the NRC, in accordance with § 71.1, of its intent to apply its previously approved subpart H, Appendix B, or subpart G quality assurance program to transportation activities. The licensee, certificate holder, and applicant for a CoC shall identify the program by date of submittal to the Commission, Docket Number, and date of Commission approval.			
§71.101 (g)	Quality assurance requirements.		C	Amended Paragraph (g): (g) Radiography containers. A program for transport container inspection and maintenance limited to radiographic exposure devices, source changers, or packages transporting these devices and meeting the requirements of § 34.31(b) of this chapter or equivalent Agreement State requirement, is deemed to satisfy the requirements of §§ 71.17(b) and 71.101(b).	N/A		

§71.103 (a)	Quality assurance organization.	§175.105 (e)(2)	[C] for those States which have users of Type B packages-other than	Amended Paragraph (a): (a) The licensee ² , certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of the quality assurance program. The licensee, certificate holder, and applicant for a CoC	N		
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			<p>Industrial Radiography</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)</p>	<p>may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part of the quality assurance program, but shall retain responsibility for the program. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions.</p> <p>-----</p> <p>² While the term "licensee" is used in these criteria, the requirements are applicable to whatever design, fabrication, assembly, and testing of the package is accomplished with respect to a package before the time a package approval is issued.</p>			
§71.103 (b)	Quality assurance organization.		<p>C for those States which have users of Type B packages—other than</p>	<p>Amended Paragraph (b): (b) The quality assurance functions are— (1) Assuring that an appropriate quality assurance program is established and effectively executed; and (2) Verifying, by procedures such as</p>	N		

			Industrial Radiography	checking, auditing, and inspection, that activities affecting the functions that are important to safety have been correctly performed.			
			D otherwise				

§71.103 (c), (d), (e)&(f)	Quality assurance organization.		D	<p>Amended Paragraphs (c), (d), (e)&(f):</p> <p>(c) The persons and organizations performing quality assurance functions must have sufficient authority and organizational freedom to—(1) Identify quality problems;</p> <p>(2) Initiate, recommend, or provide solutions; and</p> <p>(3) Verify implementation of solutions.</p> <p>(d) The persons and organizations performing quality assurance functions shall report to a management level that assures that the required authority and organizational freedom, including sufficient independence from cost and schedule, when opposed to safety considerations, are provided.</p> <p>(e) Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms, provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational</p>	N/A		
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			<p>freedom.</p> <p>(f) Irrespective of the organizational structure, the individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program, at any location where activities subject to this section are being performed, must have direct access to the levels of management necessary to perform this function.</p>			
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<p>§71.105 (a), (c)&(d)</p>	<p>Quality assurance program.</p>	<p>§175.105 (e)(3)(i)</p>	<p>C for those States which have users of Type B packages-other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR</p>	<p>Amended Paragraphs (a), (c)&(d):</p> <p>(a) The licensee, certificate holder, and applicant for a CoC shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program that complies with the requirements of §§ 71.101 through 71.137. The licensee, certificate holder, and applicant for a CoC shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with those procedures throughout the period during which the packaging is used. The licensee, certificate holder, and applicant for a CoC shall identify the material and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organizations.</p> <p>(c) The licensee, certificate holder, and applicant for a CoC shall base the requirements and procedures of its quality</p>	<p>N</p>		
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			<p>34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)</p>	<p>assurance program on the following considerations concerning the complexity and proposed use of the package and its components:</p> <ol style="list-style-type: none"> (1) The impact of malfunction or failure of the item to safety; (2) The design and fabrication complexity or uniqueness of the item; (3) The need for special controls and surveillance over processes and equipment; (4) The degree to which functional compliance can be demonstrated by inspection or test; and (5) The quality history and degree of standardization of the item. <p>(d) The licensee, certificate holder, and applicant for a CoC shall provide for indoctrination and training of personnel performing activities affecting quality, as necessary to assure that suitable proficiency is achieved and maintained. The licensee, certificate holder, and applicant for a CoC shall review the status and adequacy of the quality assurance program at established intervals. Management of other organizations participating in the quality assurance program shall review regularly the status and adequacy of that part of the quality assurance program they are executing.</p>			
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§71.105 (b)	Quality assurance program.	§175.105 (e)(3)(ii)	[C]	<p>Amended Paragraph (b): (b) The licensee, certificate holder, and applicant for a CoC, through its quality assurance program, shall provide control over activities affecting the quality of the</p>	N		
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				<p>identified materials and components to an extent consistent with their importance to safety, and as necessary to assure conformance to the approved design of each individual package used for the shipment of radioactive material. The licensee, certificate holder, and applicant for a CoC shall assure that activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied. The licensee, certificate holder, and applicant for a CoC shall take into account the need for special controls, processes, test equipment, tools, and skills to attain the required quality, and the need for verification of quality by inspection and test.</p>			
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§71.127	Handling, storage, and shipping control.	§175.105 (e)(14)	<p>[C]- for those States which have users of Type B packages- other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part</p>	<p>Amended Section: The licensee, certificate holder, and applicant for a CoC shall establish measures to control, in accordance with instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to be used in packaging to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided.</p>	N		
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			71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)				
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§71.129	Inspection, test, and operating status.	§175.105 (e)(15)		[C]- for those States which have users of Type B	Amended Section: (a) The licensee, certificate holder, and applicant for a CoC shall establish measures to indicate, by the use of	N		
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			<p>packages- other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)</p>	<p>markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the packaging. These measures must provide for the identification of items that have satisfactorily passed required inspections and tests, where necessary to preclude inadvertent bypassing of the inspections and tests.</p> <p>(b) The licensee shall establish measures to identify the operating status of components of the packaging, such as tagging valves and switches, to prevent inadvertent operation.</p>			
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§71.131	Nonconforming materials, parts, or components.	§175.105 (e)(16)		<p>[C]- for those States which have users of Type B packages- other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through</p>	<p>Amended Section:</p> <p>The licensee, certificate holder, and applicant for a CoC shall establish measures to control materials, parts, or components that do not conform to the licensee's requirements to prevent their inadvertent use or installation. These measures must include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.</p>	N		
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				71.137.)			
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§71.133	Corrective action.	§175.105 (e)(17)		<p>C- for those States which have users of Type B packages- other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies §71.12 (b) and thus would satisfy those</p>	<p>Amended Section: The licensee, certificate holder, and applicant for a CoC shall establish measures to assure that conditions adverse to quality, such as deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of a significant condition adverse to quality, the measures must assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented and reported to appropriate levels of management.</p>	N		
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				sections referenced in this provision (§§71.101 through 71.137.)			
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§71.135	Quality assurance records.	§175.105 (e)(18)		<p>C- for those States which have users of Type B packages- other than Industrial Radiography **</p> <p>D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also indicated that this section satisfies</p>	<p>Amended Section:</p> <p>The licensee, certificate holder, and applicant for a CoC shall maintain sufficient written records to describe the activities affecting quality. The records must include the instructions, procedures, and drawings required by § 71.111 to prescribe quality assurance activities and must include closely related specifications such as required qualifications of personnel, procedures, and equipment. The records must include the instructions or procedures which establish a records retention program that is consistent with applicable regulations and designates factors such as duration, location, and assigned responsibility. The licensee, certificate holder, and applicant for a CoC shall retain these records for 3 years beyond the date when the licensee, certificate holder, and applicant for a CoC last engage in the activity for which the quality assurance program was developed. If any portion of the written procedures or instructions is superseded, the licensee, certificate holder, and applicant for a CoC shall retain the superseded material for 3 years after it is superseded.</p>	N	
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				<p>§71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)</p>				
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§71.137	Audits.	§175.105 (e)(19)		<p>C - for those States which have users of Type B packages- other than Industrial Radiography **D otherwise</p> <p>**Note: 10 CFR Part 71.101 (g) indicates that QA programs for industrial radiography Type B package users are covered by 10 CFR 34.31 (b). It also</p>	<p>Amended Section: The licensee, certificate holder, and applicant for a CoC shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program. The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibilities in the areas being audited. Audited results must be documented and reviewed by management having responsibility in the area audited. Followup action, including re-audit of deficient areas, must be taken where indicated.</p>	N		
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				indicated that this section satisfies §71.12 (b) and thus would satisfy those sections referenced in this provision (§§71.101 through 71.137.)				
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Appendix A to Part 71	Determination of A ₁ and A ₂	Appendix A	[B]	REFERENCE 10CFR71 FOR TABLES A-1, A-2, A-3, and A-4 Amended Appendix: I. Values of A ₁ and A ₂ for individual	N			
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			<p>radionuclides, which are the bases for many activity limits elsewhere in these regulations, are given in Table A-1. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) figure. The curie values are expressed to three significant figures to assure that the difference in the TBq and Ci quantities is one tenth of one percent or less. Where values of A_1 and A_2 are unlimited, it is for radiation control purposes only. For nuclear criticality safety, some materials are subject to controls placed on fissile material.</p> <p>II. a. For individual radionuclides whose identities are known, but which are not listed in Table A-1, the A_1 and A_2 values contained in Table A-3 may be used. Otherwise, the licensee shall obtain prior Commission approval of the A_1 and A_2 values for radionuclides not listed in Table A-1, before shipping the material.</p> <p>b. For individual radionuclides whose identities are known, but which are not listed in Table A-2, the exempt material activity concentration and exempt consignment activity values contained in Table A-3 may be used. Otherwise, the licensee shall obtain prior Commission approval of the exempt material activity concentration and exempt consignment activity values for radionuclides not listed in Table A-2, before shipping the material.</p> <p>c. The licensee shall submit requests for prior approval, described under paragraphs II.a. and II.b. of this Appendix, to the Commission, in accordance with § 71.1 of this part.</p> <p>III. In the calculations of A_1 and A_2 for a radionuclide not in Table A-1, a single radioactive decay chain, in which radionuclides are present in their naturally</p>			
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occurring proportions, and in which no daughter radionuclide has a half-life either longer than 10 days, or longer than that of the parent radionuclide, shall be considered as a single radionuclide, and the activity to be taken into account, and the A_1 and A_2 value to be applied, shall be those corresponding to the parent radionuclide of that chain. In the case of radioactive decay chains in which any daughter radionuclide has a half-life either longer than 10 days, or greater than that of the parent radionuclide, the parent and those daughter radionuclides shall be considered as mixtures of different radionuclides.

IV. For mixtures of radionuclides whose identities and respective activities are known, the following conditions apply:

a. For special form radioactive material, the maximum quantity transported in a Type A package is as follows:

where $B(i)$ is the activity of radionuclide I, and $A_1(i)$ is the A_1 value for radionuclide I.

b. For normal form radioactive material, the maximum quantity transported in a Type A package is as follows:

where $B(i)$ is the activity of radionuclide I, and $A_2(i)$ is the $A_2(i)$ value for radionuclide I.

c. Alternatively, the A_1 value for mixtures of special form material may be determined as follows:

A_1 for mixture where $f(i)$ is the fraction of activity for radionuclide I in the mixture, and $A_1(i)$ is the appropriate A_1 value for radionuclide I. d. Alternatively, the A_2 value for mixtures of normal form material may be determined as follows:

A_2 for mixture

where $f(i)$ is the fraction of activity for radionuclide I in the mixture, and $A_2(i)$ is the appropriate A_2 value for radionuclide I.

e. The exempt activity concentration for mixtures of nuclides may be determined as follows:

Exempt activity concentration for mixture

where $f(i)$ is the fraction of activity concentration of radionuclide I in the mixture, and $[A]$ is the activity concentration for exempt material containing radionuclide I.

f. The activity limit for an exempt consignment for mixtures of radionuclides may be determined as follows:

Exempt consignment activity limit for mixture

where $f(i)$ is the fraction of activity of radionuclide I in the mixture, and A is the activity limit for exempt consignments for radionuclide I.

V. When the identity of each radionuclide is known, but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped, and the lowest A_1 or A_2 value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph IV. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A_1 or A_2 values for the alpha emitters and beta/gamma emitters.

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		§175.101 (n)(4)	<p>or plated foils of half-life greater than 120 days and in quantities exceeding 10^{12} times the applicable quantities set forth in appendix B to part 30 (or when a combination of isotopes is involved if R, as defined in Sec. 30.35(a)(1), divided by 10^{12} is greater than 1), shall submit a decommissioning funding plan as described in paragraph (e) of this section. The decommissioning funding plan must be submitted to NRC by December 2, 2005.</p> <p>(d) Table of required amounts of financial assurance for decommissioning by quantity of material. Licensees required to submit the \$1,125,000 amount must do so by December 2, 2004. Licensees required to submit the \$113,000 or \$225,000 amount must do so by June 2, 2005. Licensees having possession limits exceeding the upper bounds of this table must base financial assurance on a decommissioning funding plan.</p> <p>Greater than 10^4 but less</p>	N		
		§175.101				

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		(n)(4)(i)		<p>than or equal to 10^5 times the applicable quantities of appendix B to part 30 in unsealed form. (For a combination of isotopes, if R, as defined in Sec. 30.35(a)(1), divided by 10^4 is greater than 1 but R divided by 10^5 is less than or equal to 1).....\$1,125,000</p>	N		<p>No difference as concerns NYC vs. C amt of \$1,125,000. for 10^4-10^5 quantity in unsealed form. (Amt. was formerly \$750,000. for this activity level in unsealed form in Article 175)</p>
		§175.101 (n)(4)(ii)		<p>Greater than 10^3 but less than or equal to 10^4 times the applicable quantities of appendix B to part 30 in unsealed form. (For a combination of isotopes, if R, as defined in Sec. 30.35(a)(1), divided by 10^3 is greater than 1 but R divided by 10^4 is less than or equal to 1).....\$225,000</p>	N		<p>No difference as concerns NYC vs. C amt of \$225,000. for 10^3-10^4 quantity in unsealed form. (Amt. was formerly \$150,000. for this activity level in unsealed form in Article 175)</p>
		§175.101 (n)(4)(iii)		<p>Greater than 10^{10} but less than or equal to 10^{12} times the applicable quantities of appendix B to part 30 in sealed sources or plated foils. (For a combination of isotopes, if R, as defined in Sec. 30.35(a)(1), divided by 10^{10} is greater than, 1, but R divided by</p>	N		<p>No difference as concerns NYC vs. C amt of \$113,000. for 10^{10}-10^{12} quantity as sealed sources or plated foil. (Amt. was formerly \$75,000. in Article 175. Upper limit 1012 did not appear.)</p>

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		§175.101 (n)(5)	<p>financial assurance in an amount based on a decommissioning funding plan as described in paragraph (e) of this section. The decommissioning funding plan must include the cost of disposal of the maximum amount (curies) of radioactive material permitted by license, and the cost of disposal of the maximum quantity, by volume, of radioactive material which could be present at the licensee's facility at any time, in addition to the cost to remediate the licensee's site to meet the license termination criteria of 10 CFR part 20. The decommissioning funding plan must be submitted by December 2, 2005.</p> <p>(e) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (f) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. Cost estimates</p>	N		
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				must be adjusted at intervals not to exceed 3 years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (f) of this section.			
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§40.36	Financial assurance and recordkeeping for decommissioning	§175.101 (n)(2)(ii)	H&S	Amended Paragraphs (b)(2)&(d): (b)(2) Submit a certification that financial assurance for decommissioning has been provided in the amount of \$225,000 by June 2, 2005 using one of the methods described in paragraph (e) of this section. For an applicant, this certification may state that the	Y	N	NYC states "signed original of the financial instrument ... must be submitted to the Department prior to receipt of licensed material"
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		§175.101 (n)(5)	<p>appropriate assurance will be obtained after the application has been approved and the license issued but before the receipt of licensed material. If the applicant defers execution of the financial instrument until after the license has been issued, a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section must be submitted to NRC prior to receipt of licensed material. If the applicant does not defer execution of the financial instrument, the applicant shall submit to NRC, as part of the certification, a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section.</p> <p>(d) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (e) of this section, including means for adjusting cost estimates and associated funding levels periodically</p>	N	
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				over the life of the facility. Cost estimates must be adjusted at intervals not to exceed 3 years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section.		
§40.36 cf (\$30.35)	Financial assurance and recordkeeping for decommissioning	§175.101 (n)(3)(ii)	D	Amended Paragraph (c)(2): (c)(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit a decommissioning funding plan as described in paragraph (d) of this section or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning	N/A N	No difference as concerns NYC vs. CI amt of \$1,125,000 or license issue date of July 27, 1990. (Amt. was formerly \$750,000; license issue date was formerly August 1, 1994 in Article 175

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				funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal. Licensees required to submit the \$1,125,000 amount must do so by December 2, 2004.			
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§70.25	Financial assurance and recordkeeping for decommissioning	§175.101 (n)(3)(iv)	D	Amended Paragraphs (c)(2)&(e): (c)(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit a decommissioning funding plan as described in paragraph (e) of this section or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning	N		Entire paragraph §70.25(c)(2) newly inserted in Article 175 as is.
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		§175.101 (n)(5)		<p>funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.</p> <p>(e) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (f) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. Cost estimates must be adjusted at intervals not to exceed 3 years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (f) of this section.</p>	N		
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§70.25	Financial	§175.101	H&S	Amended Paragraph (d):	N		
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assurance and recordkeeping for decommissioning	(n)(4)		(d) Table of required amounts of financial assurance for decommissioning by quantity of material. Licensees required to submit the \$1,125,000 amount must do so by December 2, 2004. Licensees required to submit the \$225,000 amount must do so by June 2, 2005. Licensees having possession limits exceeding the upper bounds of this table must base financial assurance on a decommissioning funding plan.			
	§175.101 (n)(4)(i)		Greater than 10^4 but less than or equal to 10^5 times the applicable quantities of appendix B to part 30. (For a combination of isotopes, if R, as defined in Sec. 70.25(a), divided by 10^4 is greater than 1 but R divided by 10^5 is less than or equal to 1.).....\$1,125,000	N		No difference as concerns NYC vs. CI amt of \$1,125,000. for 10^4 - 10^5 quantity in unsealed form. (Amt. was formerly \$750,000. for this activity level in unsealed form in Article 175)
	§175.101 (n)(4)(ii)		Greater than 10^3 but less than or equal to 10^4 times the applicable quantities of appendix B to part 30. (For a combination of isotopes, if R, as defined in Sec.	N		No difference as concerns NYC vs. CI amt of \$225,000. for 10^3 - 10^4 quantity in unsealed form. (Amt. was formerly \$150,000. for this activity level in unsealed form in Article 175)

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				70.25(a), divided by 10^3 is greater than 1 but R divided by 10^4 is less than or equal to 1.)..... \$225,000			
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