

DEPARTMENT OF CONSUMER & INDUSTRY SERVICES

RADIATION SAFETY SECTION

(By authority conferred on the department of public health by section 13521 of Act No. 368 of the Public Acts of 1978, as amended, and section 48 of Act No. 306 of the Public Acts of 1969, as amended, being SS333.13521 and 24.248 of the Michigan Compiled Laws)

PART 2. LICENSING OF RADIOACTIVE MATERIAL

R 325.5051. Purpose and scope.

Rule 51. (1) This part provides for the licensing of radioactive material. A person shall not own, receive, acquire, possess, use or transfer radioactive material except as authorized in a specific or general license issued pursuant to this part or as otherwise provided in this part.

(2) In addition to the requirements of this part, a licensee is subject to the requirements of parts 1 and 5. A licensee engaged in industrial radiographic operations is subject to the requirements of part 6, a licensee using certain particle accelerators is subject to part 11, and a licensee using sealed sources in the healing arts is subject to the requirements of part 12.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

RADIOACTIVE MATERIAL OTHER THAN SOURCE MATERIAL

R 325.5074. Exempt quantities.

Rule 74. (1) Except as provided in subrules (3) and (4), a person is exempt from these rules to the extent that he owns, receives, acquires, possesses, uses or transfers a byproduct, naturally occurring or accelerator material in individual quantities each of which does not exceed the applicable quantity set forth in rule 147.

(2) A person who possesses radioactive material formerly received or acquired under the general license provided in 10 CFR Part 31, § 31.4 of the NRC regulations is exempt from the requirements for a license set forth in this part to the extent that he owns, possesses, uses or transfers such radioactive material.

(3) Subrule (1) does not authorize the production, packaging or repackaging of radioactive material for purposes of commercial distribution, or the incorporation of radioactive material into products intended for commercial distribution.

(4) A person, for purposes of commercial distribution, shall not transfer radioactive material in the individual quantities set forth in rule 147, knowing or having reason to believe that such quantities of radioactive material will be transferred to persons exempt under subrule (1) or equivalent regulations of the NRC or an agreement state, except in accordance with a specific license issued by the NRC pursuant to section 32.18 of 10 CFR Part 32 which license states that the radioactive material may be transferred by the licensee to persons exempt under subrule (1) or the equivalent regulations of the NRC or an agreement state.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

SPECIFIC LICENSES

R 325.5101. Applications.

Rule 101. (1) An application for a specific license shall be filed on a form prescribed by the department and shall be accompanied by the appropriate license fee as specified in rules 141 to 145.

(2) The application shall be signed by the applicant or licensee or a person authorized to act for and on his behalf.

(3) An application for a license may include a request for a license authorizing 1 or more activities.

(4) In his application, the applicant may incorporate by reference information contained in previous applications, statements or reports filed with the department if the references are clear and specific.

(5) The department at any time after the filing of the original application, and before the expiration of the license, may require further statements in order to enable the department to determine whether the application will be granted or denied or whether a license will be modified or revoked.

(6) The application and documents submitted to the department may be made available for public inspection except that the department may withhold any document or part thereof from public inspection if disclosure of its content is not required in the public interest and would adversely affect the interest of a person concerned.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5102. General requirements for specific licenses.

Rule 102. The department shall approve a license application if it determines all of the following:

(a) The applicant or the designated individual user is qualified by reason of training and experience to use the material in question for the purpose requested in accordance with these rules in such a manner as to minimize danger to public health and safety or property.

(b) The applicant's proposed equipment, facilities and procedures are adequate to minimize danger to public health and safety or property.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

SPECIAL REQUIREMENTS FOR ISSUANCE OF CERTAIN SPECIFIC LICENSES

R 325.5117a. Particle accelerator licenses.

Rule 117a. (1) A particle accelerator capable of producing radioactive material in excess of exempt quantities listed in schedule B of rule 147 shall not be operated in a manner likely to produce such quantities of radioactive material unless a person is authorized to operate in a specific license issued pursuant to this rule.

(2) A particle accelerator licensed pursuant to this rule is exempt from registration under part 4.

(3) Subject to rule 122 a person shall submit an application for a specific license to operate a particle accelerator subject to this rule in accordance with rule 101.

(4) The department shall issue a specific license for a particle accelerator subject to licensing under this rule when it determines all of the following:

(a) The applicant will have an adequate program for training accelerator operators and submits to the department a schedule or description of the program which specifies the:

(i) Initial training.

(ii) Periodic training.

(iii) On-the-job training.

(iv) Means to be used by the licensee to determine the operator's knowledge and understanding of and ability to comply with department rules and licensing requirements, and the operating and emergency procedures of the applicant.

(b) The applicant has established and submits to the department satisfactory written operating and emergency procedures.

(c) The applicant will have an adequate internal inspection system, or other management control, to assure that license provisions, rules and the applicant's operating and emergency procedures are followed by operators and all other individuals associated with the accelerator operation.

(d) The applicant submits to the department a description of his overall organizational structure pertaining to the particle accelerator program, including specified delegations of authority and responsibility for operation of the program.

(e) The applicant has applied for or has been issued a valid license to own, receive, acquire, possess, use and transfer radioactive material produced or used in connection with accelerator operation.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5118. Issuance of specific licenses.

Rule 118. (1) As used in this rule the term "as it deems appropriate or necessary" means as the department determines is appropriate or necessary in order to minimize danger to public health and safety or property; and prevent loss or theft of material subject to this part.

(2) Upon a determination that an application meets the requirements of the act and these rules the department shall issue a specific license authorizing the proposed activity in such form and containing such conditions and limitations as it deems appropriate or necessary.

(3) The department may incorporate in any license at the time of issuance, or thereafter by appropriate rule or order, such additional requirements and conditions with respect to the licensee's receipt, possession, use and transfer of radioactive material subject to this part as it deems appropriate or necessary.

(4) The department may require such reports and the keeping of such records, and may provide for such inspections of activities under the license as it deems appropriate or necessary.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5119. Specific terms and conditions of licenses.

Rule 119. (1) A license issued under this part is subject to all the provisions of the act, now or hereafter in effect, and to all rules and orders of the department.

(2) A license issued or granted under this part and a right to possess or utilize radioactive material granted by a license issued under this part shall not be transferred, assigned or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of any license to any person unless the department, after securing full information finds that the transfer is in accordance with the provisions of the act, and gives its consent in writing.

(3) A person licensed by the department under this part shall confine his use and possession of the material licensed to the locations and purposes authorized in the license.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5120. Expiration, renewal and amendment of licenses.

Rule 120. (1) Except as provided in subrule (3), each specific license expires at the end of the day, in the months and year stated therein.

(2) An application for renewal of a specific license shall be filed in accordance with rule 101.

(3) If a licensee, not less than 30 days before expiration of his existing license, has filed an application in proper form for renewal or for a new license authorizing the same activities, the existing license does not expire until the application has been finally determined by the department.

(4) An application for amendment of a license shall be filed in accordance with rule 101 and shall specify the respects in which the licensee desires his license to be amended and the grounds for such amendment.

(5) In considering an application by a licensee to renew or amend his license, the department shall apply the criteria set forth in rules 102 to 111, or rules 112 to 117.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5122. Radioactive material other than agreement material possessed before these rules.

Rule 122. A person who, on the effective date of these rules, possesses naturally occurring or accelerator-produced radioactive material or a particle accelerator for which a specific license is required by this part or the act is deemed to possess a like license issued under this part and the act. The license expires 90 days after the effective date of these rules; however, if within the 90 days the person possessing the material files an application in proper form for a license, the existing license does not expire until the application has been finally determined by the department.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5124. Modification, revocation, and termination of licenses.

Rule 124. (1) The terms and conditions of a license are subject to amendment, revision or modification or the license may be suspended or revoked by reason of amendments to the act, or by reason of rules and orders issued by the department.

(2) A license may be revoked, suspended or modified, in whole or in part, for:

(a) A material false statement in the application or any statement of fact required under the act.

(b) A condition revealed by the application or statement of fact or any report, record or inspection or other means which would warrant the department to refuse to grant a license on an original application.

(c) A violation of, or failure to observe any of the terms and conditions of the act, the license, or any rule or order of the department.

(3) Except in a case of willfulness or where the public health, interest or safety requires otherwise, a license shall not be modified, suspended or revoked unless, before the institution of proceedings therefor, facts or conduct which may warrant the action have been called to the attention of the license in writing and the licensee has been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements.

(4) The department may terminate a specific license upon request submitted by the licensee to the department in writing.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

LICENSE FEES

R 325.5141. Application fees.

Rule 141. (1) A license application for which a fee is prescribed in rule 144 shall be accompanied by a remittance in the full amount of the fee unless the applicant has been exempted from fee payment under rule 143.

(2) An application will not be accepted for filing or processed before payment of the full amount specified unless exempted from fee payment. An application for which a remittance is not received may be returned to the applicant.

(3) All application fees shall be retained irrespective of the department's disposition of the application or a withdrawal of the application.

(4) The application fee serves as the license fee for the first year after issuance of the license irrespective of the time interval between date of application and date of issuance.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5142. Annual fees.

Rule 142. (1) An annual license fee is payable 1 year after the date of issuance of the license and annually thereafter.

(2) The annual fee shall be submitted in a timely manner so that its receipt is assured on or before the due date in order to maintain the license in effect.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5143. Exemptions.

Rule 143. (1) Application fees or annual fees are not required for licenses applied for by, or issued to:

(a) An agency of this state or any political subdivision thereof for radioactive material or accelerators to be used primarily for services rendered on a charitable basis or in connection with a facility used primarily for charitable purposes.

(b) A nonprofit educational institution for radioactive material or accelerators to be used exclusively for teaching or training purposes or in connection with a facility used exclusively for teaching or training purposes.

(2) Application fees or annual fees are not required for licenses authorizing the use of source material as shielding only in devices and containers, but all other licensed radioactive material in the device or container is subject to the fees prescribed in rule 144 unless otherwise exempted under this rule.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Consumer & Industry Services.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5144 Fee schedule.

Rule 144. Applicants for specific radioactive material licenses and licensees issued these licenses shall pay the appropriate license fees and shall be subject to the footnotes specified in the following fee schedule unless exempted under rule 143.

[Note: The requirements of this rule that pertain to radiation machine registration, licensing, or compliance are under the purview of the Michigan Department of Licensing and Regulatory Affairs.]

SCHEDULE OF RADIOACTIVE MATERIAL LICENSE FEES

Category of License ¹	Applica tion Fee ²	Annu al Fee ^{3 4}
1. Special Nuclear Material: ⁵		
A. Special licenses for special nuclear material in quantities not sufficient to form a critical mass, except those licenses covered by categories 4A, 4B, 5A, 6A, 7A, 7B, 7C, 7D, or 8A.	\$200	\$200
2. Source Material:		
A. Specific licenses for source material for use in milling operations and licenses for refining mill concentrates to uranium hexafluoride.	\$10,000	\$10,000

Category of License ¹	Applica tion Fee ²	Annu al Fee ^{3 4}
B. Specific licenses for source material in quantities greater than 50 kilograms except licenses for storage only and licenses for use only of source material in counterweights.	\$150	\$150
C. All other specific licenses for source material, except those licenses covered by categories 4A, 4B, 6A, 7A, 7B, 7C, 7D, or 8A.	\$75	\$75
3. Radioactive Material Other than Special Nuclear Material or Source Material: ⁶		
A. Specific licenses for source material for use in milling operations and licenses for refining mill concentrates to uranium hexafluoride	\$2,000	\$2,000
B. Specific licenses for possession and use of radioactive material for processing, or manufacturing of items containing radioactive material where no product safety evaluation is required or quantities of radioactive material for commercial distribution except exempt quantities as defined in rule 74.	\$1,000	\$1,000
C. Specific licenses for radioactive material for industrial radiography operations at one location.	\$300	\$300
D. Specific licenses for radioactive material for industrial radiography operations at more than one location.	\$600	\$600
E. Specific licenses for possession and use of radioactive material in quantities of less than 10,000 curies in sealed sources for irradiation of materials.	\$100	\$100
F. Specific licenses for possession and use of radioactive material in quantities of 10,000 curies or more in sealed sources for irradiation of materials.	\$200	\$200
G. Specific licenses issued pursuant to rule 107 to distribute items containing radioactive material or quantities of radioactive material to persons generally licensed under rules 84 to 92 except, specific licenses authorizing redistribution of items which have been manufactured or imported under a specific license and licensed by the department, the NRC or an agreement state for distribution to persons generally licensed under rules 84 to 92.	\$300	\$300
H. Specific licenses for possession and use of radioactive material for research and development, except those licenses covered by categories 3A or 3B, and licenses covered by categories 7B, 7C, or 7D authorizing medical research.	\$250	\$250
I. Non-human use of radium.	\$50	\$50

Category of License ¹	Applica tion Fee ²	Annu al Fee ^{3,4}
J. All other specific radioactive material licenses except those in categories 4A, 4B, 5A, 6A, 7A, 7B, 7C, 7D, or 8A.	\$50	\$50
4. Waste Disposal:		
A. Waste disposal licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of commercial disposal by the waste disposal licensee by land burial.	\$3,000	\$3,000
B. Waste disposal licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of commercial disposal by the waste disposal licensee by transfer to another person authorized to receive such material.	\$400	\$400
5. Well Logging, Well Surveys and Tracer Studies:		
A. Specific licenses for possession and use of radioactive material for well logging, well surveys and tracer studies.	\$250	\$250
6. Nuclear Laundries:		
A. Specific licenses for commercial collection and laundry of items contaminated with radioactive material.	\$500	\$500
7. Human Use:		
A. Specific licenses for human use of radioactive material in sealed sources contained in teletherapy devices.	\$150	\$150
B. Specific licenses for human use of radium in sealed sources for brachytherapy.	\$100	\$100
C. Specific licenses issued to medical institutions for human use of radioactive material, except licenses in categories 7A or 7B.	\$200	\$200
D. Specific licenses issued to physicians for human use of radioactive material, except licenses in categories 7A or 7B.	\$100	\$100
8. Civil Defense:		
A. Specific licenses for possession and use of radioactive material for civil defense activities.	\$35	\$35
9. Particle Accelerators: ⁷		
A. Specific licenses for particle accelerators for production of radioactive material for transfer to other persons.	\$2,000	\$2,000
B. Specific licenses for particle accelerators for production of radioactive material not to be transferred to other persons except for disposal.	\$1,500	\$1,500
C. Specific licenses for particle accelerators used exclusively for high-energy research. (Research and development).	\$1,000	\$1,000

Category of License ¹	Applica tion Fee ²	Annu al Fee ^{3 4}
D. Specific licenses for particle accelerators used exclusively for food processing or materials processing or control.	\$500	\$500
E. Specific licenses for particle accelerators for human use.	\$300	\$300
F. All other specific licenses for particle accelerators.	\$250	\$250

FOOTNOTES

To

Schedule of Radioactive Material License Fees

- ¹ Amendments based on applications filed after the due date of the annual license fee reducing the scope of a licensee's program or cancelling a license, will not entitle the licensee to a partial refund of an annual fee that has been paid by the licensee for the year in which such amendment or cancellation occurs. Applications for amendments increasing the scope of a program to a higher fee category will not be accepted for filing unless accompanied by the prescribed fee less the amount of the currently prescribed fee for the activities already licensed.
- ² Applications for specific licenses covering more than 1 fee category shall be accompanied by the prescribed fee for each category.
- ³ Payment of the prescribed annual fee does not automatically renew the license for which the fee is paid. Renewal applications shall be filed in accordance with the requirements of rule 120. Applications for reissuance of licenses that have expired because a timely renewal application was not filed shall be accompanied by the prescribed application fee.
- ⁴ The annual fee will be waived where an application is filed to cancel the license prior to the due date of the annual fee, and the amount of the annual fee will be reduced where an application is filed to amend the license to reduce its scope before the due date of the annual fee. *However*, an annual fee will not be waived or reduced unless the application filed before the due date of the fee contains all the information necessary to permit the department to complete the requested action
- ⁵ Specific licenses for special nuclear material in quantities sufficient to form a critical mass may be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20545.
- ⁶ Such radioactive material includes accelerator material, byproduct material, and naturally occurring material.
- ⁷ Particle accelerators not capable of producing radioactive material in excess of exempt quantities listed in schedule B of rule 147 and radiation machines excluded from the particle accelerator definition by design and use are exempt from licensing under this part. However, such radiation machines are subject to registration under part 4. Particle accelerators licensed under this part are exempt from registration under part 4.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5145. Payment of fees.

Rule 145. (1) License fee payments shall be by check, draft or money order payable to the "State of Michigan".

(2) Fee payments shall be received by the Michigan Department of Public Health, Division of Radiological Health, Licensing & Compliance Control Section, 3500 North Logan Street, Lansing, Michigan 48914.

(3) In any case where the department finds that a licensee has failed to pay the applicable annual fee required in this part, the department may suspend or revoke the license or may issue such order with respect to licensed activities as the department determines to be necessary to carry out the provisions of these rules and the act.

[Note: As a result of Executive Orders 1996-1 and 1996-2, the authority, powers, duties, functions, and responsibilities of the radiation machine registration, licensing, and compliance program were transferred to the Michigan Department of Consumer & Industry Services. With respect to machine sources of ionizing radiation, any correspondence to the Michigan Department of Public Health should now be addressed to the Michigan Department of Consumer & Industry Services, BHS, Radiation Safety Section, P.O. Box 30664, Lansing, Michigan 48909.]

History: 1954 ACS 85, Eff. Dec. 3, 1975.

SCHEDULES A TO D

R 325.5147 Schedule B - Exempt quantities.

Rule 147. See rule 74.

Radionuclide	Microcuries
Antimony 122 (Sb122)	100
Antimony 124 (Sb124)	10
Antimony 125 (Sb125)	10
Arsenic 73 (As73)	100
Arsenic 74 (As74)	10
Arsenic 76 (As76)	10
Arsenic 77 (As77)	100
Barium 131 (Ba131)	10
Barium 133 (Ba133)	10
Barium 140 (Ba140)	10
Bismuth 210 (Bi210).....	1
Bromine 82 (Br82).....	10
Cadmium 109 (Cd109)	10
Cadmium 115m (Cd115m)	10
Cadmium 115 (Cd115)	100
Calcium 45 (Ca45).....	10
Calcium 47 (Ca47).....	10
Carbon 14 (C14)	100
Cerium 141 (Ce141)	100
Cerium 143 (Ce143)	100
Cerium 144 (Ce144)	1
Cesium 131 (Cs131)	1,000
Cesium 134m (Cs134m)	100
Cesium 134 (Cs134)	1
Cesium 135 (Cs135)	10
Cesium 136 (Cs136)	10
Cesium 137 (Cs137)	10

Chlorine 36 (Cl36)	10
Chlorine 38 (Cl38)	10
Chromium 51 (Cr51).....	1,000
Cobalt 58m (Co58m)	10
Cobalt 58 (Co58).....	10
Cobalt 60 (Co60).....	1
Copper 64 (Cu64)	100
Dysprosium 165 (Dy165)	10
Dysprosium 166 (Dy166)	100
Erbium 169 (Er 169)	100
Erbium 171 (Er 171)	100
Europium 152 (Eu152) 9.2 h	100
Europium 152 (Eu152) 13 yr.	1
Europium 154 (Eu154)	1
Europium 155 (Eu155)	10
Fluorine 18 (F18)	1,000
Gadolinium 153 (Gd153).....	10
Gadolinium 159 (Gd159).....	100
Gallium 72 (Ga72)	10
Germanium 71 (Ge71)	100
Gold 198 (Au198).....	100
Gold 199 (Au199).....	100
Hafnium 181 (Hf181)	10
Holmium 166 (Ho166).....	100
Hydrogen 3 (H3)	1,000
Indium 113m (In113m).....	100
Indium 114m (In114m).....	10
Indium 115m (In115m).....	100
Indium 115 (In115).....	10
Iodine 125 (I125)	1
Iodine 126 (I126)	1
Iodine129 (I129)	0.1
Iodine131 (I131)	1
Iodine132 (I132)	10
Iodine133 (I133)	1
Iodine134 (I134)	10
Iodine135 (I135)	10
Iridium192 (Ir192)	10
Iridium194 (Ir194)	100
Iron 55 (Fe55)	100
Iron 59 (Fe59)	10
Krypton 85 (Kr85)	100
Krypton 87 (Kr87)	10
Lanthanum140 (La140)	10
Lutetium177 (Lu177).....	100
Manganese 52 (Mn52)	10

Manganese 54 (Mn54)	10
Manganese 56 (Mn56)	10
Mercury197m (Hg197m)	100
Mercury197 (Hg197)	100
Mercury 203 (Hg203)	10
Molybdenum 99 (Mo99).....	100
Neodymium147 (Nd147).....	100
Neodymium149 (Nd149).....	100
Nickel 59 (Ni59)	100
Nickel 63 (Ni63)	10
Nickel 65 (Ni65)	100
Niobium 93m (Nb93m).....	10
Niobium 95 (Nb95).....	10
Niobium 97 (Nb97).....	10
Osmium185 (Os185).....	10
Osmium191m (Os191m)	100
Osmium191 (Os191).....	100
Osmium193 (Os193).....	100
Palladium103 (Pd103)	100
Palladium109 (Pd109)	100
Phosphorus 32 (P32).....	10
Platinum191 (Pt191)	100
Platinum193m (Pt193m).....	100
Platinum193 (Pt193).....	100
Platinum197m (Pt197m).....	100
Platinum197 (Pt197)	100
Polonium 210 (Po210)	0.1
Potassium 42 (K42).....	10
Praseodymium142 (Pr142)	100
Praseodymium143 (Pr143)	100
Promethium147 (Pm147).....	10
Promethium149 (Pm149).....	10
Rhenium186 (Re186).....	100
Rhenium188 (Re188).....	100
Rhodium103m (Rh103m).....	100
Rhodium105 (Rh105)	100
Rubidium 86 (Rb86)	10
Rubidium 87 (Rb87)	10
Ruthenium 97 (Ru97)	100
Ruthenium103 (Ru103)	10
Ruthenium105 (Ru105)	10
Ruthenium106 (Ru106)	1
Samarium151 (Sm151)	10
Samarium153 (Sm153).....	100
Scandium 46 (Sc46).....	10
Scandium 47 (Sc47).....	100

Scandium 48 (Sc48).....	10
Selenium 75 (Se75).....	10
Silicon 31 (Si31).....	100
Silver105 (Ag105).....	10
Silver100m (Ag110m).....	1
Silver111 (Ag111).....	100
Sodium 24 (Na24).....	10
Strontium 85 (Sr85).....	10
Strontium 89 (Sr89).....	1
Strontium 90 (Sr90).....	0.1
Strontium 91 (Sr91).....	10
Strontium 92 (Sr92).....	10
Sulphur 35 (S35).....	100
Tantalum182 (Ta182).....	10
Technetium 96 (Tc96).....	10
Technetium 97m (Tc97m).....	100
Technetium 97 (Tc97).....	100
Technetium 99m (Tc99m).....	100
Technetium 99 (Tc99).....	10
Tellurium125m (Te125m).....	10
Tellurium127m (Te127m).....	10
Tellurium127 (Te127).....	100
Tellurium129m (Te129m).....	10
Tellurium129 (Te129).....	100
Tellurium131m (Te131m).....	10
Tellurium132 (Te132).....	10
Terbium160 (Tb160).....	10
Thallium 200 (Tl200).....	100
Thallium 201 (Tl201).....	100
Thallium 202 (Tl202).....	100
Thallium 204 (Tl204).....	10
Thulium170 (Tm170).....	10
Thulium171 (Tm171).....	10
Tin113 (Sn113).....	10
Tin125 (Sn125).....	10
Tungsten181 (W181).....	10
Tungsten185 (W185).....	10
Tungsten187 (W187).....	100
Vanadium 48 (V48).....	10
Xenon131m (Xe131m).....	1,000
Xenon133 (Xe133).....	100
Xenon135 (Xe135).....	100
Ytterbium175 (Yb175).....	100
Yttrium 90 (Y90).....	10
Yttrium 91 (Y91).....	10
Yttrium 92 (Y92).....	100

Yttrium 93 (Y93)	100
Zinc 65 (Zn65)	10
Zinc 69m (Zn69m)	100
Zinc 69 (Zn69)	1,000
Zirconium 93 (Zr93)	10
Zirconium 95 (Zr95)	10
Zirconium 97 (Zr97)	10
Any radionuclide not listed above other than alpha emitting radioactive material	0.1

History: 1954 ACS 85, Eff. Dec. 3, 1975.